EXPLORING THE ROLE OF SOCIAL CONNECTIVITY IN SELF-DIRECTED VIOLENCE OUTCOMES AND DEPRESSIVE SYMPTOMS FOR INCARCERATED PERSONS

by

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ABSTRACT

MELANIE T. MAYFIELD. Exploring the Role of Social Connectivity in Self-directed Violence Outcomes and Depressive Symptoms for Incarcerated Persons (Under the direction of DR. ANNELISE MENNICKE and DR. APRYL ALEXANDER)

Compared to the general U.S. population, individuals incarcerated in the United States are at greater risk of self-directed violence (SDV) and depression. SDV risk factors lie within multiple domains, and critical risk factors include depression and the absence of social connection. Research has yet to comprehensively examine variation in SDV risk factors based on individual characteristics (i.e., age) or investigate the influence of modifiable risk factors that are multilevel in nature (e.g., social connectedness) on depressive symptoms and SDV in prison settings. Therefore, this dissertation research has two aims: 1) to examine demographic-based variation in SDV risk factors, including depressive symptoms and social connection, and 2) to investigate the relationship between multilevel social connectedness with depressive symptoms and SDV within the context of the social-ecological model (SEM). Three studies were conducted to meet these aims. Framed within the context of the SEM, study one is a systematic review that synthesizes findings from fifteen studies investigating the association between social connection with depression and SDV in U.S. prisons. In study two, data from the development of the Self Injury Risk Assessment Protocol for Corrections (SIRAP-C) is used to explore variations in SDV-related risk factors based on demographic characteristics such as age, race, and sex. Study three uses SIRAP-C data and two hierarchical regression models to investigate the relationships between multilevel social connection with depressive symptoms and SDV events for a sample of adults incarcerated in a U.S. state prison system. Altogether, the findings speak to the applicability of the SIRAP-C for incarcerated individuals of differing demographic backgrounds, whether there is significant variation in risk factors based on demographic characteristics,

and provide additional insight regarding the role of social connection and how it can be used in the future address depressive symptoms and SDV and depression for this population.

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LIST OF ABBREVIATIONS

AIC	Akaike Information Criterion
ANOVA	Analysis of Variance
BIC	Bayesian Information Criterion
CASE	Chronological Assessment of Suicide Events
CDC	Centers for Disease Control and Prevention
CFA	Confirmatory Factor Analysis
COVID-19	Coronavirus
EFA	Exploratory Factor Analysis
IBM	International Business Machines
IIA	Independence of Irrelevant Alternatives
IMU	Intensive Management Units
IPT	Interpersonal Psychotherapy
ITS	Interpersonal Theory of Suicide
IRB	Institutional Review Board
MMAT	Mixed Methods Appraisal Tool
NC DAC	North Carolina Department of Adult Corrections
NIMH	National Institute of Mental Health
NCCHC	National Commission on Correctional Health Care
NCIPC	National Center for Injury Prevention And Control
PRISMA	Preferred Reporting Items for Systematic Review and Analysis
RDU	Rehabilitative Diversion Units
SAMI	Suicide Assessment Manual for Inmates

SDV	Self-directed Violence
SEM	Social-Ecological Model
SESPM	Social-Ecological Suicide Prevention Model
SIB	Self-injurious Behavior
SIRAP-C	Self-injury Risk Assessment Protocol for Corrections
SPSS	Statistical Package for Social Sciences
TDU	Therapeutic Diversion Unit
WHO	World Health Organization

CHAPTER 1: INTRODUCTION

Incarceration and Self-directed Violence

The United States has the largest incarcerated population in the world (Fair & Walmsley, 2024), with about 1.2 million people incarcerated in U.S. state and federal prisons in 2022 (Carson & Kluckow, 2023b). This population experiences disproportionately higher rates of several adverse mental and physical health outcomes, including depression and self-directed violence (SDV; Carson, 2021a; Centers for Disease Control and Prevention [CDC], 2024b; Marzano et al., 2016; Wilper et al., 2009). At present, suicide is the leading cause of unnatural deaths in state and federal prison facilities (Carson, 2021a). Risk factors related to suicidal and non-suicidal SDV (e.g., a personal history of self-directed violence, current suicidal ideation, and a current psychiatric diagnosis) are also prevalent among this population (Favril, 2021; Favril et al., 2020, 2022; Marzano et al., 2016; Zhong et al., 2021). Understanding the influence and variation of these risk factors is necessary to inform SDV risk assessment, which is critical for correctional facilities.

The absence of social connection is one of the critical risk factors for SDV (Favril et al., 2020; Wakai et al., 2014; Zhong et al., 2021), while the promotion of social connection has been identified as a prevention strategy against SDV globally and nationally (Stone et al., 2017; World Health Organization [WHO], 2014). Social connection may be an appropriate target for SDV prevention in correctional settings due to its protective capabilities and ability to be modified in prison environments (Favril et al., 2022). This dissertation research seeks to investigate variations in SDV risk factors and examine the impact of social connection on depressive symptoms and SDV for those incarcerated in U.S. prisons.

Terms

- **Self-directed violence (SDV)** is defined as "behavior that is self-directed and deliberately results in injury or the potential for injury to oneself" (Crosby et al., 2011, p. 22).
- **Self-injurious behavior (SIB)**, also referred to as self-harm, is defined as the deliberate and direct destruction or alteration of body tissue without suicidal intent (Klonsky, 2007).
- **Suicidal self-directed violence** refers to "behavior that is self-directed and deliberately results in injury or the potential for injury to oneself" where there is implicit or explicit evidence of suicidal intent (Crosby et al., 2011, p. 22).
- **Suicide** is defined as a death that is caused by self-directed injurious behavior with the intention to die because of this behavior (Crosby et al., 2011).
- **Social connectedness** refers to the extent "to which a person or group is socially close, interrelated, or shares resources with other persons or groups at the individual-, family-, community-, and institutional-levels" (National Center for Injury Prevention and Control [NCIPC] & CDC, 2013, p. 3)

Incarceration and Prevalence of Self-directed Violence

In 2021, over 5.4 million people were under adult correctional supervision in the U.S. (Carson & Kluckow, 2023a). Data from the Bureau of Justice Statistics indicates that over 1.7 million people occupied the country's prisons and jails at the end of 2021, and roughly 3.7 million were under community supervision (i.e., probation and parole; Carson & Kluckow, 2023a). Of those incarcerated, about 1.2 million are held in state or federal prison facilities (Carson & Kluckow, 2023a). Data on mortality trends for individuals incarcerated in prisons demonstrate that approximately 273 per 100,000 deaths occur annually in state prisons and 233

per 100,000 in federal prisons (Carson, 2021a). Mortality in state and federal prisons is primarily caused by illnesses such as heart disease and cancer (Carson, 2021a); however, compared to adult U.S. residents, adults in state prison facilities died at lower rates from all causes except for suicide, homicide, and cancer (Carson, 2021a). From 2001-2019, suicide was identified as the leading cause of unnatural death in state prison facilities (Carson, 2021a).

Historically, suicide deaths within the prison system were rare occurrences (Mumola, 2005). Today, individuals incarcerated in state and federal prisons demonstrate higher rates of suicide than their counterparts in the general U.S. population (Carson, 2021a). In 2019, the adjusted mortality rate due to suicide for U.S. residents was about 22 per 100,000 compared to 25 per 100,000 among state prisoners (Carson, 2021a). Over 18 years (2001-2019), the number of suicides increased by 13% in local jails, 61% in federal prisons and 85% in state prisons (Carson, 2021b). In 2019, suicides accounted for 8% of all deaths in state prison facilities and 7% of deaths in federal prison facilities (Carson, 2021a). The American Foundation for Suicide Prevention previously identified the U.S. correctional system as one of four critical target areas to reduce the national suicide rate by 20% by 2025 (American Foundation for Suicide Prevention, 2021).

The historical context of the prevalence of self-injurious behavior (SIB) within the U.S. correctional system has not been well documented. In the first national study investigating SIB in prisons, Smith, and Kaminski (2011) found SIB to be a universal event occurring in 98% of surveyed prison facilities. The prevalence of SIB by incarcerated individuals in state prisons was about 2.4%, and the prevalence of serious SIB (undefined) was 0.7% (H. P. Smith & Kaminski, 2011). Another national survey found less than 2% of incarcerated persons per year engaged in SIB across 39 U.S. prison systems (Appelbaum et al., 2011). Despite the low reported average

prevalence of SIB in prisons, several facilities reported that almost a third of those incarcerated engaged in SIB (H. P. Smith & Kaminski, 2011), and according to Applebaum et al. (2011), SDV events occur frequently, often on a weekly, sometimes daily, basis. This evidence suggests that the prevalence of SIB within U.S. prison facilities has likely been underestimated.

Risk Factors Associated with Self-directed Violence in Prison

To provide effective interventions for addressing and preventing suicide and SDV, it is important to understand the risk factors associated with these phenomena. Risk factors associated with SDV appear to fall within sociodemographic, clinical, institutional, historical, and criminological domains (Favril et al., 2022; Marzano et al., 2016). Prior research has examined specific factors within each domain to determine which are the most strongly associated with SDV (Favril, 2021; Favril et al., 2020, 2022; Zhong et al., 2021). However, it is important to note that while these risk factors demonstrate strong relationships with SDV, they show little predictive validity in risk assessments (Roos et al., 2013).

Sociodemographic Risk Factors for Suicide and Self-injury in Prison

Several sociodemographic factors contribute to SDV in prisons. Sociodemographic factors that have been linked to a greater risk for suicide in prison include male sex, identifying as White race/ethnicity (Cramer et al., 2017; Daniel & Fleming, 2005; Zhong et al., 2021), and marital status (e.g., married or separated/divorced; Boren et al., 2018; Zhong et al., 2021). Findings regarding age are mixed, as younger, and older age have been associated with an increased risk of suicide in prison (Boren et al., 2018; Cramer et al., 2017; Stoliker et al., 2020). Results of a recent meta-analysis indicated no clear associations between age and suicide risk for groups 25 years of age or older in prisons (Zhong et al., 2021). Other findings show that those

between the ages of 18-29 are significantly less likely to be at risk for suicide compared to other age groups (Zhong et al., 2021).

Research examining sociodemographic factors associated with non-suicidal SDV in prisons has identified the following risk factors: homelessness, unemployment before incarceration, younger than 30 years of age, and female sex (Dixon-Gordon et al., 2012; Fagan et al., 2010; Favril et al., 2020). Specifically, those younger than 30 years of age were twice as likely as other age groups to be significantly at risk of SIB in prison (Favril et al., 2020). Findings related to gender seem to reflect the "gender paradox" in suicidal behavior in which men are more likely to die due to suicide, while women are more likely to engage in SIB (Canetto & Sakinofsky, 1998). In 2022, data showed that the suicide rate among men was four times higher than the suicide rate for women (CDC, 2024a; Ehlman, 2022), while other research shows that women are 1.5 times more likely to engage in non-suicidal SDV (Bresin & Schoenleber, 2015).

Historical Risk Factors for Suicide and Self-injury in Prison

Historical risk factors refer to life events (Marzano et al., 2016) that occurred prior to an individual's incarceration. Several historical factors are strongly associated with increased suicide risk, including a family history of suicide, a history of psychiatric diagnoses, a history of alcohol and drug abuse, and a history of SDV (Cramer et al., 2017; Fagan et al., 2010; Favril et al., 2020; Marzano et al., 2016; White et al., 2002; Zhong et al., 2021). Current research suggests that those with a history of attempting suicide were 8.2 times more likely to have an increased risk of suicide in prison, while those with a history of self-harm were 7.1 times more likely (Zhong et al., 2021). Historical risk factors strongly associated with SIB in prison include childhood abuse (i.e., sexual, physical, and emotional), family history of suicide or self-harm,

ever experiencing sexual abuse, and a history of local authority (i.e., foster care placement; Favril et al., 2020). Those with histories of any form of childhood abuse were at least twice as likely to be at increased risk of SIB in prison. Those who had specifically experienced childhood sexual abuse appeared to be at greatest risk, as they were almost four times more likely to be at increased risk for SIB while incarcerated (Favril et al., 2020). Family history of suicide was associated with a tripled likelihood of risk of SIB, and family history of SIB was almost twice as likely (Favril et al., 2020). A recent study examining the prevalence of victimization among individuals incarcerated in U.S. prisons found that more than half of all incarcerated men (56%) and women (54%) had experienced physical victimization in childhood (Wolff et al., 2009). Additionally, the estimated lifetime prevalence of post-traumatic stress disorder (PTSD) was 27% in men and 49% of women incarcerated in the U.S. (Baranyi et al., 2018), demonstrating that a substantial portion of this population is affected by violence, victimization, and trauma.

Criminological and Institutional Factors for Suicide and Self-Injury in Prison

Criminological factors refer to those related to an individual's criminal history and incarceration (Zhong et al., 2021). Evidence has shown that several criminological factors are associated with an increased risk of suicide in prison. These factors include being held in custody, pretrial detention, sentence length, serving a life sentence, and violent offenses, specifically homicide and sexual offenses (Boren et al., 2018; Cramer et al., 2017; Daniel & Fleming, 2005; White et al., 2002; Zhong et al., 2021). One study found that conviction of non-violent offenses was associated with a higher risk of a suicide attempt (Boren et al., 2018); however, there is also evidence that drug offense convictions are inversely associated with suicide (Zhong et al., 2021). Criminological factors strongly associated with SIB in prisons

include violent offenses, a history of prior incarceration, receiving a sentence for more than five years, and serving a life sentence (Favril et al., 2020).

The institutional domain consists of prison-related characteristics or experiences. Institutional factors associated with increased risk of suicide include housing placement (e.g., single-cell housing, administrative detention), security level (e.g., maximum or high security), interpersonal conflicts while incarcerated, disciplinary infractions, isolation, single-cell housing, and no social visits (Boren et al., 2018; Cramer et al., 2017; Favril, 2021; Favril et al., 2022; Zhong et al., 2021). Institutional factors contributing to the risk of SIB in prison include solitary confinement, maximum-security housing, higher staffing ratios, disciplinary infractions, and experiencing physical or sexual victimization while incarcerated (Favril et al., 2020; H. P. Smith & Kaminski, 2011). These findings demonstrate that social isolation associated with prison life and exposure to negative events such as violence or disciplinary actions may contribute to increased risk for SIB or suicide.

Clinical Factors for Suicide and Self-Injury in Prison

Clinical risk factors refer to physiological attributes associated with an increased risk of certain diseases or death (The Scottish Public Health Observatory, 2023). The clinical risk factors strongly associated with suicide in prisons include suicidal ideation, a history of SDV, prescribed psychotropic medication, a current psychiatric diagnosis, receipt of mental health treatment, as well as substance and alcohol use (Daniel & Fleming, 2005; Mennicke et al., 2021; White et al., 2002; Zhong et al., 2021). Clinical risk factors strongly associated with SIB in prisons include current or recent suicidal ideation, a lifetime history of suicidal ideation, previous self-harm, a current psychiatric diagnosis, or psychiatric treatment in prisons (Appelbaum et al., 2011; Favril et al., 2020).

Mental illness is one of the most prevalent risk factors associated with SDV (CDC, 2022a; Favril et al., 2020; Van Orden et al., 2010; Zhong et al., 2021). Approximately 41% of individuals incarcerated in U.S. prisons have a history of a mental health problem (Maruschak & Bronson, 2021). According to prior research, certain diagnoses are likely to increase the risk of suicide or SIB. These diagnoses include depression, borderline personality disorder, anxiety disorder, and substance use disorder (Favril et al., 2020, 2022; Marzano et al., 2016; Zhong et al., 2021). The rate of psychiatric disorders among incarcerated individuals is significantly higher compared to the general population (Fazel et al., 2016; National Alliance on Mental Illness, 2022), and there is evidence suggesting that depriving aspects of the prison environment (i.e., denial of experiences or resources accessible before incarceration) may exacerbate an individual's mental health challenges (Dye, 2010; Edgemon & Clay-Warner, 2019; Favril, 2021).

Depression, Suicide, and Self-Injury. Depression is one of the most significant risk factors for suicide. Depression is a common mood disorder characterized by feelings such as hopelessness and despair and loss of interest or pleasure in activities that last for at least two weeks (James & Glaze, 2006; National Institute of Mental Health [NIMH], 2023; WHO, 2023). In the U.S., depression is prevalent in approximately one in 10 adults (Goodwin et al., 2022). At present, major depressive disorder is the most common mental disorder reported in state and federal prisons (Maruschak & Bronson, 2021). The most recently available data on mental disorders among the U.S. correctional population revealed that approximately 32.9% of those incarcerated in state prisons and 23.7% of those incarcerated in federal prisons had experienced major depressive symptoms in the 12 months since admission (James & Glaze, 2006). Evidence shows that individuals diagnosed with depression are almost five times more likely to be at

greater risk of suicide in prison and 9.3 times more likely to be at greater risk of SIB in prison than those who are not (Favril et al., 2020; Zhong et al., 2021).

Risk factors for depression include personal or family histories of depression, major life changes, exposure to trauma, experiencing stress, and certain physical illnesses or medications (NIMH, 2024). For individuals diagnosed with major depressive disorder, factors such as a history of suicidal behaviors, alcohol/substance use disorders, stressful life events, negative family factors, and comorbid anxiety are predictors of suicidal ideation, suicide attempts, and suicide (Li et al., 2022). Those who are incarcerated are more likely to be exposed to stressful experiences and trauma than their counterparts in the general community, increasing their risk for depression and depressive symptoms (DeHart et al., 2014; Moore et al., 2021).

Protective Factors for Suicide and Self-Injury

Several factors have been identified to aid in SDV prevention for the general population. According to the (CDC, 2022a), reasons for living, a strong sense of cultural identity, and effective coping and problem-solving skills protect against the risk of suicide. Healthy relationships, which take the form of support from friends and family as well as feeling connected to others, also protect against suicide risk (CDC, 2022a). Within the community, research indicates that feeling connected to school and community, as well as availability to consistent and quality healthcare, contribute to decreased risk of suicide. In the broader societal context, reduced access to lethal methods of suicide, as well as cultural, religious, or moral objections to suicide, contribute to decreased risk (CDC, 2022a)

Several factors protect against SDV in prisons. These protective factors include social connection (e.g., pseudo-families, established communication with family), removal of lethal methods of suicide, dormitory housing, education regarding medicine to treat depression, support

via ongoing medical and mental health care relationships, and participation in religious services (Boren et al., 2018; Cramer et al., 2017; Fagan et al., 2010). Many of these protective factors involve some form or aspect of social connection. The unique nature of social connection as a modifiable risk and protective factor in the prison environment makes it a clear focus for SDV risk assessment and prevention for incarcerated individuals.

Social Connectedness and Self-Directed Violence

The CDC defines connectedness as "the degree to which a person or group is socially close, interrelated, or shares resources with other persons or groups" (NCIPC & CDC, 2013, p. 3). This definition is an application of the social-ecological perspective as it accounts for both the nature and quality of social relationships across multiple levels. This definition also encompasses a range of concepts used across various literatures, such as social support, social isolation, loneliness, social withdrawal, physical separation from others, and loss of a loved one (Van Orden et al., 2010).

Social isolation has been identified as one of the most significant and reliable predictors of SDV and is a key component of the interpersonal theory of suicide (ITS), where it is referred to as thwarted belongingness (Van Orden et al., 2010). Social isolation has often been conceptualized as a measure of one aspect of the higher order construct of social connectedness, which can be measured at various levels (Berkman et al., 2000). It is argued that variables related to social connectedness are proxies for a fundamental human need to belong (Baumeister & Leary, 1995; Van Orden et al., 2010), which may result in SDV if this need goes unmet (Van Orden et al., 2010).

Just as social isolation, or thwarted belongingness, has been identified as a key factor in increasing the risk for SDV, the promotion of social connectedness via strengthening

connectedness at the individual-, family-, and community-levels has been identified as a key strategy for SDV prevention by the CDC and WHO (NCIPC & CDC, 2013; Stone et al., 2017; WHO, 2014). The CDC's perspectives regarding social connectedness coincide with its four-level social-ecological model (SEM; CDC, 2022b). The CDC uses the SEM to examine various aspects of health promotion and prevention, including violence and social connectedness (CDC, 2022b). This approach to social connection for suicide prevention guides the conceptual framework used in this dissertation research.

Conceptual Framework

The Interpersonal Theory of Suicide

ITS is described as a social theory of suicidal behavior. For the purposes of the theory, suicidal behavior is defined as "ideations, communications, and behaviors that involve some degree of intent to die" (Van Orden et al., 2010, p. 2) and includes both lethal and non-lethal suicide attempts. There are three primary constructs of ITS: thwarted belongingness, perceived burdensomeness, and the acquired capability for suicide (Joiner, 2005; Van Orden et al., 2010). The primary assumptions of the ITS are: (1) thwarted belongingness, combined with perceived burdensomeness, leads to the desire for suicide, and (2) the presence of all three constructs leads to a suicide attempt (Van Orden et al., 2010).

The construct of thwarted belongingness is in part based on evidence that social isolation is a strong and reliable predictor of suicidal behavior over the life course (Calati et al., 2019; Leigh-Hunt et al., 2017; McClelland et al., 2020; Van Orden et al., 2010). It is assumed that belonging, or connectedness, is a fundamental human psychological need, and when that need goes unmet, it may lead to a desire for suicide or death (Baumeister & Leary, 1995; Van Orden et al., 2010, 2012). The thwarted belongingness construct is considered an individual,

interpersonal need that is multidimensional in nature (Van Orden et al., 2010). Two key dimensions of thwarted belonging are “loneliness” and “the absence of reciprocal care.” Loneliness refers to feelings of disconnect and too few social connections (Van Orden et al., 2010). This coincides with the need to belong, which has been conceptualized as frequent and positive interactions (Van Orden et al., 2010). Absence of reciprocal care refers to the lack of relationships in which those involved feel cared for and demonstrate care for each other (Van Orden et al., 2010). These reciprocally caring relationships must involve positive interactions and take place in a stable, supportive context (Baumeister & Leary, 1995; Van Orden et al., 2010). The concept of thwarted belongingness is considered a dynamic and multidimensional factor influenced by inter- and intrapersonal factors, varying over time and in magnitude (Van Orden et al., 2010).

Additional risk factors found to be strongly associated with suicide include physical illness, family conflict, and unemployment (Van Orden et al., 2010). Those who developed the ITS propose that the common link between these risk factors is that they may develop into the perception that one is a burden to others that they are close to (Joiner, 2005; Van Orden et al., 2010). In other words, an individual may perceive that they are causing those close to them hardship or distress. The two key dimensions of interpersonal functioning for perceived burdensomeness are beliefs that one is a liability to others and thoughts and feelings of self-hate. Perceived burdensomeness is also considered a dynamic factor that varies over time and in terms of magnitude (Van Orden et al., 2010). This construct also captures an aspect of social connection regarding an individual’s perception of worth or expendability in relation to other people (Chu et al., 2017).

Based on these assertions, the first hypothesis of ITS states that "...thwarted belongingness and perceived burdensomeness are proximal and sufficient causes of passive suicidal ideation" (Van Orden et al., 2010, p. 20). This means that an individual experiencing either of these phenomena may experience suicidal ideation that manifest in thoughts or beliefs of desire for death rather than a desire to engage in lethal behaviors (Van Orden et al., 2010). Next, ITS states that "... a mental state characterized by the simultaneous presence of thwarted belongingness, perceived burdensomeness, and hopelessness about one's interpersonal connections is proximal and sufficient cause of suicidal desire." (Van Orden et al., 2010, p. 21), meaning that the absence of thwarted belongingness, perceived burdensomeness, or hopelessness would ensure that the development of active suicidal desire would be hindered.

The final component of the ITS is the capability for suicide. Joiner (2005) refers to this as the acquired ability to enact lethal self-injury, stating that this capability builds up over time with recurrent and escalating dangerous experiences that involve both pain and provocation. Recurrent exposure to these types of experiences makes it habitual and diminishes the fear and pain associated with these types of behaviors (Van Orden et al., 2010). Therefore, the capability of suicide encompasses two dimensions - a lowered fear of death and an elevated tolerance for physical pain. Prior research has demonstrated that these two dimensions are specific to suicidal behaviors (Van Orden et al., 2010). Therefore, the third hypothesis of ITS states that "...the simultaneous presence of suicidal desire and the first component of acquired capability - lowered fear of death - serves as the conditions under which suicidal desire will transform into suicidal intent" (Van Orden et al., 2010, p. 22). The final hypothesis of this theory states "... the outcome of serious suicidal behavior is most likely to occur in the context of suicidal intent (which results from thwarted belongingness, perceived burdensomeness, and hopelessness regarding both),

reduced fear of suicide, and elevated physical pain tolerance" (Van Orden et al., 2010, p. 22). This means that each component is necessary for the development of suicidal behavior to occur.

There is evidence that there may be a third dimension contributing to the acquired capability of suicide. In their exploratory factor analysis, Smith et al. (2013) examined the acquired capability for suicide scale in a prison population, which resulted in three factors rather than the two factors previously discussed by Joiner (2005) and Van Orden and colleagues (2010). Like Van Orden (2010), the first factor consisted of "general fearlessness" (or reduced fear) and "perceived pain tolerance," and the second consisted of "fearlessness of death." The third factor consisted of "spectator enjoyment of violence" or enjoyment from witnessing (i.e., exposure to) violence (P. N. Smith et al., 2013). These findings suggest that general exposure to violence may be a distinct dimension rather than a contributor to reduced fear of death and elevated tolerance for pain.

The Interpersonal Theory of Suicide in the Context of Incarceration

The components of ITS (thwarted belongingness, perceived burdensomeness, and capacity for suicide) have been operationalized and used to examine associations of the components with SDV outcomes in clinical, student, community, military, and detainee (held in-custody) populations (Chu et al., 2017; Ma et al., 2016). This research typically tests the main effects of one component of ITS, while examinations of two- and three-way interactions are less frequent (Ma et al., 2016). Generally, results from studies investigating the relationships between the ITS components and suicide have been mixed.

Studies that have tested direct relationships between thwarted belongingness and SDV report mixed results. Research has demonstrated that individually, thwarted belongingness and perceived burdensomeness are significantly and positively associated with suicidal thoughts and

behaviors across various populations (Chu et al., 2017; Ma et al., 2016). For the acquired capability of suicide, some studies found support for a direct relationship between acquired capability for suicide with suicide attempts and suicide ideation (Chu et al., 2017; Ma et al., 2016), while others reported a non-significant association (Ma et al., 2016). Other findings have demonstrated that the two-way interaction of thwarted belongingness and perceived burdensomeness with suicide ideation and risk is significant (Chu et al., 2017; Ma et al., 2016); however, it is noted that this interaction was only significant when high levels of perceived burdensomeness were present (Ma et al., 2016). Evidence is mixed regarding three-way interactions, as some literature reports significant associations between suicidal thoughts and behaviors and risk for suicide (Chu et al., 2017; Ma et al., 2016), while other literature reports no association (Ma et al., 2016).

There is limited research that has examined ITS in correctional populations. Of the existing studies, ITS has been supported in correctional samples. One study found that the two-way interaction of thwarted belongingness and perceived burdensomeness contributed significantly to the prediction of suicide ideation for men who were incarcerated in prison (Mandracchia & Smith, 2015). The findings also indicated that while perceived burdensomeness was predictive of suicide ideation alone, the same was not true for thwarted belongingness (Mandracchia & Smith, 2015). A recent investigation of risk factors for attempts and/or threats of SDV among incarcerated individuals also found support for ITS (Cain & Ellison, 2022), reporting that a greater likelihood of threats and/or attempts of suicide and self-harm were associated with higher degrees of thwarted belongingness and perceived burdensomeness.

Incarceration is understood to be a painful and depriving experience, often adversely affecting individuals physically, mentally, emotionally, and economically both during and after

their imprisonment (Dye, 2010; Haney, 2001; Paterline & Orr, 2016). Deprivation refers to a lack of basic and material necessities (Dye, 2010; Fedock, 2017). The "pains" of incarceration, coined by Sykes (Western & Sykes, 2020), characterize key depriving aspects of prisons, such as loss of liberty, goods, services, heterosexual relationships, autonomy, and security (Dye, 2010; Haggerty & Bucerius, 2020). Together, these depriving aspects make imprisonment painful and stressful, often leading to poor outcomes such as suicide (Dye, 2010). Due to the nature of the experience of incarceration, it can be argued that thwarted belongingness, perceived burdensomeness, and capability for suicide are inherent characteristics of imprisonment. Results from prior research demonstrate a need to examine the components of ITS further with consideration of setting, component dimensions, and population characteristics (Chu et al., 2017; Ma et al., 2016). This may be key to gaining a better understanding of the associations between ITS components and self-directed violence.

Incarceration and Thwarted Belongingness

As previously mentioned, evidence indicates that one of the most significant and reliable predictors of suicidal behavior and thinking is social isolation, which is related to thwarted belongingness (Van Orden et al., 2010). Various dimensions of social isolation have been examined in the literature. Most familiar are loneliness, loss of social connections and relationships, and having few or weak social supports (Berkman et al., 2000; Van Orden et al., 2010; You et al., 2011), which directly reflects the components of thwarted belongingness. Within the context of incarceration, institutional factors such as single cell occupancy, solitary confinement, administrative segregation, and having no social visits have been found to increase the risk for suicidal thoughts and behaviors (Favril et al., 2020, 2022; Marzano et al., 2016; Van

Orden et al., 2010; Zhong et al., 2021). This is unsurprising as incarceration is inherently an isolating experience.

The purpose of incarceration is to confine and separate individuals who have committed a crime and have been deemed a threat or safety concern from the rest of the general community (Mackenzie, 2001; Shammas, 2017). Confining an individual to a correctional facility separates them from the general community, their communities, neighborhoods, friends, and family members. Subsequently, policies and institutional contexts such as administrative segregation, solitary confinement, and security restrictions further isolate individuals within the correctional setting (Dye, 2010; Haney, 2018). Overall, the experience of incarceration is characterized by physical and social isolation, meaning that incarcerated persons will experience thwarted belongingness while serving their sentence.

Incarceration and Perceived Burdensomeness

Incarceration often places various burdens on incarcerated individuals along with their families and communities. There is a significant financial burden, as a disproportionate number of incarcerated persons come from low-income backgrounds, and incarceration often leads to greater poverty (deVuono-Powell et al., 2015). Findings from a 2015 study found that, on average, families with an incarcerated family member incur over $13,000 worth of annual debt for costs related to legal fees and fines, resources (i.e., commissary), and maintaining contact with their incarcerated family member (traveling for visits, phone calls, and email; deVuono-Powell et al., 2015).

In addition to this, incarcerated individuals often belong to families in which they provide financial, material, and emotional support and fulfill parental or caretaker roles. For example, over half of those incarcerated in prisons are mothers (58%), and just under half are fathers

(47%) to minor children, leaving almost 1.5 million children without at least one parent for an extended period of time (Maruschak & Bronson, 2021). Incarcerated individuals are no longer able to provide or contribute these forms of support to their families or communities during their imprisonment, forcing their loved ones to compensate for the loss while simultaneously providing for the incarcerated person (deVuono-Powell et al., 2015). Therefore, the experience of incarceration places an actual and perceived burden on the incarcerated person and their loved ones, which is likely present for many people who are incarcerated.

Incarceration and Capability for Suicide

Recent data shows that while up to 12.3 million people in the general U.S. population reported having suicidal thoughts, 1.7 million people attempted suicide (CDC, 2024a), demonstrating that most of the individuals who think about suicide do not actually engage in suicidal behavior. However, those who experience incarceration may be more likely than those in the general community to experience pathways to capability for suicide due to past and current perpetration and exposure to violent experiences. This implies that individuals in prison may already possess or are more likely to develop a reduced fear of death and an increased tolerance for physical pain. It is argued that exposure to trauma and enacting violence onto others desensitizes one to pain, increasing their tolerance for pain as well as their exposure to fear-inducing experiences (Joiner, 2005; Van Orden et al., 2010). Additionally, there is evidence suggesting that certain dimensions of the acquired capability for suicide may be more relevant than others, depending on the population. Specifically for those incarcerated, exposure to violence may be a more significant dimension for acquired capability rather than the other two dimensions (e.g., reduced fear, pain tolerance; P. N. Smith et al., 2013).

Prior work established a significant link between exposure to violence and/or trauma and the acquired capability for suicide. For example, one study found that painful and provocative life experience domains (e.g., aggression, military combat experience, physical assault/sexual abuse, suicidal thoughts and behaviors, and accidental injury) were significantly associated with acquired capability for suicide (P. N. Smith et al., 2016). Those who are incarcerated are more likely to have histories of abuse, physical and sexual victimization, and trauma than their counterparts in the general community (DeHart et al., 2014; Meade et al., 2021; Moore et al., 2021). One study's findings suggest that those who experience incarceration may be more likely to develop a capability for suicide due to prior and current exposure to violence and trauma (P. N. Smith et al., 2013).

The Social-Ecological Model

Ecological Models of Human Development and Health Behaviors

ITS provides a theoretical foundation for the underlying mechanisms of SDV and identifies belonging as one of the most critical components of the theory (Van Orden et al., 2010, 2012). The construct of thwarted belonging highlights the importance of social connection but does not fully capture the multidimensionality of connection, as there is little consideration for the greater social context in which individuals live and experience their lives (Mueller et al., 2021). The social-ecological perspective can aid in creating a comprehensive approach to belonging and external social context and will be used to guide this dissertation research.

The social-ecological perspective can be described as a paradigm centered on the interrelations between human behavior, environmental contexts, and health or well-being (Stokols, 1996). The core principles of this model are rooted in Bronfenbrenner's ecological systems theory of human development, which postulates that social environments provide the

context for human development through the life course (Bronfenbrenner, 1994). The ecological system consists of five subsystems: (1) the microsystem - individual characteristics and proximal social relationships and environments, (2) the mesosystem - linkages between social connections and settings, (3) the exosystem - indirect environments, (4) the macrosystem - broad social, cultural, and political contexts, and (5) the chronosystem - time (Bronfenbrenner, 1994; Kilanowski, 2017). This theory assumes that the subsystems interact reciprocally.

The ecological systems theory contributed to the foundations for the development of ecological models of health behavior, which aim to address health promotion, health behaviors, and prevention. Ecological models differ from alternative theories of behavior that emphasize individual-level characteristics (i.e., social and psychological influences) by accounting for broader influences such as communities, organizations, and policies (Sallis et al., 2008; Stokols, 1996). Sallis and colleagues (2008) propose four core principles for ecological models of health behavior: (1) multiple influences operating on multiple levels influence health behaviors, (2) these influences interact across different levels, (3) models should be specific to the targeted health behavior so that the most relevant influences for each level are identified, and (4) the most effective interventions for changing behavior should be multilevel. The overall objective of these models is to inform systematic approaches for multilevel interventions and maximize changes in behavior (Sallis et al., 2008).

Social-Ecological Models for Violence Prevention and Suicide

The social-ecological paradigm was adopted by the CDC (2002b) as part of its social-ecological model for violence prevention (Dahlberg & Krug, 2006). The CDC utilizes a four-level model rooted in social-ecological theory to address health promotion and prevention for issues such as violence prevention. The four levels of the CDC's SEM are as follows: (1)

individual, (2) relationship, (3) community, and (4) society. The individual-level consists of an individual's demographic characteristics such as age, income, education, and health history, as well as biology, which may increase the likelihood of that individual perpetrating or becoming a victim of violence (CDC, 2022b; Dahlberg & Krug, 2006) The relationship-level consists of interpersonal relationships with family, peers, and partners, which could directly influence impact an individual's behavior and experiences, influencing their risk of perpetrating or becoming a victim of violence (CDC, 2022b; Dahlberg & Krug, 2006). The community-level consists of the more distal settings where an individual's social relationships and interactions occur (i.e., neighborhoods, schools, and workplaces). The fourth level is the societal-level, consisting of broad social factors and contexts affecting health. This includes social and cultural patterns or norms as social, educational, economic, and health-related policies (CDC, 2022b; Dahlberg & Krug, 2006).

Adapted from the CDC's SEM, the social-ecological suicide prevention model (SESPM) was developed to provide a comprehensive and structured approach to theory, assessment, and prevention efforts related to SDV (Cramer & Kapusta, 2017). The SESPM consists of a compilation of the risk and protective factors associated with suicide-related thoughts and behaviors organized at the individual-, relationship-, community-, and societal-levels. There are major risk and protective factors related to social connection at each level of the SESPM. Examples of these socially-based risk and protective factors include rejection or thwarted belongingness (individual), presence and use of social support (relationship), crisis support lines and community involvement (community), and stigma about mental health and treatment (societal; Cramer & Kapusta, 2017). These models have provided a foundation for the

development of a SEM that attempts to capture the multidimensional and multilevel nature of social connection to be applied to correctional settings.

A Social-Ecological Model for Social Connection in Correctional Settings

This dissertation research focuses on the unique environment of U.S. state prison facilities, where the magnitude of isolation is unparalleled. This environment necessitates a specific model that considers the aspects of social connection, or thwarted belongingness, at each level of the four-part SEM and their interactions. The different levels of social connection are examined within the context of the prison environment, which is unique in terms of the magnitude of isolation incarcerated individuals face in those settings. This research sought to explore these associations to better inform our understanding of the relationships between social connection and suicidal and self-harming thoughts and behaviors within this unique setting.

To achieve this, I have developed a SEM for social connectedness within a correctional setting (Figure 1). This model is informed by the components of ITS (Joiner, 2005; Van Orden et al., 2012) and the coinciding constructs used in the development of the Self-injury Risk Assessment Protocol for Corrections (SIRAP-C; Cramer et al., 2022). The SIRAP-C consists of seven SDV risk and protective factors subscales (Cramer et al., 2022), which include various social connection constructs. These constructs were mapped onto the four-level SEM and include social isolation, lack of family connections, responsibility to loved ones, supportive family relationships, social support within the institution, support services, and housing type.

Individual-Levels of Social Connection within the Context of Incarceration

Social connection at the individual-level refers to degrees of social integration characterized by the presence, frequency, and quality of interpersonal social relationships (NCIPC & CDC, 2009). To experience greater social integration, an individual typically needs to

have established social relationships, a high frequency of social contact, and lower levels of social isolation and feelings of loneliness (NCIPC & CDC, 2013). Evidence has shown that greater degrees of social integration act as a protective factor against suicidal ideation and behaviors (NCIPC & CDC, 2013).

Within the context of incarceration, individual-level of social connection is likely influenced by factors of the pre-prison characteristics of incarcerated individuals (Dye, 2010; Paterline & Orr, 2016). These characteristics include one's values, behavior patterns (social and psychological), and demographic characteristics (Dye, 2010). Pre-incarceration characteristics, combined with the presence, frequency, and quality of close relationships established before incarceration, likely influence the risk for SDV at the individual level. This is demonstrated in evidence regarding associations between marriage and SDV, where married individuals appear to be at increased risk of suicide while incarcerated (Zhong et al., 2021). Aspects of importation related to social connection should also be considered, including interpersonal relationships and an individual's responsibility to their loved ones before incarceration. The dynamics of these relationships are likely to change during incarceration, which physically and socially isolates individuals from interpersonal connections established before incarceration. How these changes may occur are elaborated below.

Relationship-Levels of Social Connection within the Context of Incarceration

Social connection at the relationship level refers to close interpersonal relationships with family members, partners, and friends or peers whose behaviors directly influence the individual's experiences. This level examines how these close relationships may increase or decrease the risk of SDV as they fulfill the need to belong. Within the context of incarceration, aspects of social connection at the relationship-level are likely influenced by depriving aspects of

the prison environment. It has been theorized, primarily through the work of Sykes (Western & Sykes, 2020), that the prison environment deprives individuals of the following: liberty, goods and services, heterosexual relationships, autonomy, and security (Dye, 2010; Paterline & Orr, 2016); however, incarceration does not just deprive individuals of heterosexual relationships, it deprives them of all pre-incarceration interpersonal relationships. Incarceration physically separates individuals from their partners, families, children, friends, and peers. Additionally, methods of contacting or visiting those outside prison facilities are typically restricted, regulated, and subject to fees (Federal Bureau of Prisons, n.d.; North Carolina Department of Public Safety, 2021; Wagner & Jones, 2019), which likely changes the quality and frequency of social contact and connections. Specific relationship indicators of social connection that affect SDV risk are lack of social visits and poor social support (Favril, 2021; Favril et al., 2020, 2022; Marzano et al., 2016; Zhong et al., 2021).

Community-Levels of Social Connection within the Context of Incarceration

In the general community, social connection at the community-level refers to positive attachments one has to community organizations, which are defined as organizations that provide various programs and services to individuals in the community (Wilson et al., 2012). It may also refer to social connections and interactions that occur within the settings where an individual may live, work, learn, or play. At this level, it is important to identify the characteristics of the physical or social setting that may be associated with risk for SDV, including the availability, accessibility, and quality of formal helping resources and services (NCIPC & CDC, 2013). Other challenges in the general community that may contribute to SDV risk are lack of access to healthcare, stress, discrimination, and historical trauma (CDC, 2022a)

Incarcerated individuals have no choice but to live within a correctional facility, which becomes their community. This community is characterized by specific restrictions that deprive individuals physically and socially to varying degrees. Services within the context of incarceration refer to formal relationships or the provision of services that address individuals' specific needs while incarcerated. The types of services and programming provided in federal prisons include educational and employment programming, psychiatric treatment (i.e., cognitive behavioral therapy), mental health programming, substance use treatment, sex offender treatment, domestic violence programming, and social support programming (Duwe, 2017). According to a National Institute of Justice report, despite a clear need for social support programming, there are few formal institutional programs dedicated to helping incarcerated persons with maintaining, developing, or enhancing their prosocial sources of support (Duwe, 2017). Additionally, these programs have not been adequately evaluated to determine their effectiveness (Duwe, 2017). Likely, community factors such as the availability and participation of prison programs and services impact the overall experience of incarceration and how an individual might adjust or adapt to living in prison.

Institutional-Levels of Social Connection within the Context of Incarceration

Generally, the social or institutional-level of the SEM refers to the broad social factors (e.g., societal and cultural norms) contributing to the climate in which a problem or phenomenon occurs (CDC, 2022c). Social connection at the institutional-level in the general population includes formal relationships between support services and formal organizations for the general community (NCIPC & CDC, 2013). Once individuals enter a correctional facility, they are subjected to that institution's norms, policies, and procedures. Newly incarcerated individuals must assimilate from the social norms of greater society to those of prison, a process referred to

as “prisonization” or prison adjustment (Haney, 2001; Paterline & Orr, 2016). Adjustment can manifest in numerous ways, for instance, withdrawing, opposing others, or joining the existing social structure among incarcerated persons. The purpose of the social structure for incarcerated individuals is to combat the painful experiences of incarcerated life (Dye, 2010; Paterline & Orr, 2016). However, it is important to note that this social structure must coexist within a formal organization (Dye, 2010). The prison administration determines the facility's structure and dictates the daily routines and activities of those incarcerated. This generally limits choice regarding mobility, privacy, and resources or goods. Incarceration is a painful experience due to the various deprivations that occur within a correctional environment (Dye, 2010, 2011; Shammas, 2017). The level of deprivation an incarcerated person may experience often depends on the security level of prisons. Maximum-security prisons (the highest level of security) are often found to be more depriving (e.g., greater loss of resources, liberty, and social opportunities) than medium or minimum-security prisons (the lowest level of security; Dye, 2010).

Violations of prison procedures often lead to consequences such as revoked privileges or solitary confinement (Haney, 2018). Solitary confinement, sometimes called administrative segregation (Frost & Monteiro, 2016), capitalizes on the depriving aspects of prison life. Solitary confinement can be thought of as imposed and extreme conditions of isolation from others (Haney, 2018). This practice further isolates individuals and deprives them of meaningful social contact and access to positive stimulation (Haney, 2018). It is important to note that most suicides in state prisons from 2015 to 2019 took place in either a cell or room, segregation units, or a special medical or mental health services unit (Carson, 2021b). Most suicides in prison take place in facilities with the highest security levels such as maximum-security settings or

correctional inpatient hospitals, which are among the most restrictive, regulated, and surveilled correctional environments (Boren et al., 2018; Daniel, 2006; Favril, 2021).

Solitary confinement has also been linked to chronic depression, self-harm, suicidal ideations, and behaviors, deteriorated mental and physical health, and increased acts of violence against others (Favril et al., 2020; Haney, 2001, 2018; Zhong et al., 2021). Additional aspects of deprivation that could potentially affect the risk of SDV at the institutional-level include exposure to prison violence, violent victimization, levels of confinement within the institution (i.e., single-cell occupancy versus multi-cell occupancy), overcrowding (lack of privacy or space), and loss of autonomy (Daniel, 2006). Therefore, within the context of incarceration, social connection at the institutional-level refers to the social and physical structure of the facility, as well as policies and procedures imposed by the prison, which are often determined by security levels. Security levels typically fall within minimum, maximum, and medium categories. Minimum-security prisons are typically the least restrictive, minimizing control over incarcerated persons, while maximum-security facilities are the most restrictive, exerting the most control over incarcerated individuals and their movements (H. P. Smith & Kaminski, 2011).

Limitations and Gaps in the Literature

While the absence of social connectedness has been identified as a key risk factor for SDV among incarcerated persons, there is limited research that examines the relationship between these phenomena among incarcerated populations (Favril et al., 2020; Zhong et al., 2021). Research that has examined these relationships often uses limited conceptualizations of social connection and fails to conduct multilevel investigations of social connection, as much of

the literature examining social connection among incarcerated persons only focuses on one type of social contact or connection (Favril et al., 2020; Folk et al., 2019; Zhong et al., 2021).

Additionally, while there is research that examines demographic variation regarding SDV outcomes, there is a lack of research exploring demographic variation in risk factors for SDV among incarcerated populations. Meta-analytic results show that there is a need to clarify differences in suicide risk in prisons by sociodemographic factors such as age and sex to account for potential interactions between the two characteristics (Zhong et al., 2021). Further, there seems to be a lack of professional consensus regarding risk factors for SIB alone (Fagan et al., 2010), which is likely due to the treatment of SIB as a risk factor for suicide.

The occurrence of SDV in correctional settings creates several challenges involving custodial staff, health care access and treatment, and safety concerns (Fagan et al., 2010). Recommended efforts toward suicide prevention include socially-based interventions such as support for help-seeking behaviors, family and community support, support from ongoing medical and mental health care relationships, learned skills related to addressing interpersonal conflicts as well as effective clinical interventions (Davidson et al., 1999; Fagan et al., 2010). This is related to the status of social connection as both a risk and protective factor for SDV. Social connection is modifiable, and there are avenues to effectively address this factor in correctional settings. An example would be interpersonal psychotherapy, a structured approach to addressing interpersonal problems and social support. This evidence-based therapy has demonstrated success in correctional settings but has rarely been implemented (Johnson et al., 2019; Johnson & Zlotnick, 2008, 2012). This research aims to not only explore the relationships between social connection with SDV and depression but also provide some insights related to the potential use of socially-based interventions in correctional settings.

Dissertation Research

Despite recent declines in incarceration rates, millions of people will directly and/or indirectly experience incarceration in their lifetimes. Incarcerated people are likely to enter correctional facilities with high rates of substance and mental health issues, victimization, abuse, trauma, and various physical health conditions. These problems are further exacerbated by the depriving aspects of the prison environment, which contribute to adverse physical and mental outcomes, at times leading to one injuring themselves or attempting to take their own life. Many aspects of correctional settings are difficult to change due to the purpose of these facilities, which is to confine and isolate people convicted of crimes and increase public safety for the general community. Therefore, it is crucial to better understand modifiable aspects of the prison environment, such as social connection, which is strongly associated with the severe and lethal outcomes of SDV. By focusing on social connectedness and its relationship with SDV, we may gain a better understanding of effective ways to prevent and address suicide and SIB within this unique context. The purpose of this dissertation is to determine if there are variations in SDV risk factors based on demographic characteristics and to examine the associations between various forms of social connection with SDV and depressive symptoms.

Study One

Study one is a systematic review synthesizing the current literature regarding social connection, depressive symptoms, and SDV in U.S. prisons. The objective of this review was to investigate associations between social connection with SDV and depressive symptoms in this population. To my knowledge, no systematic review has specifically examined social connectedness as the predictor of the outcomes of interest for a sample of individuals incarcerated in U.S. prisons. This review contributes to our understanding of the various ways in

which social connection is conceptualized and applied to correctional settings and populations. The target journal for study one is *Archives of Suicide Research*.

Study Two

Study two is a secondary data analysis that examined demographic variation in the Self-Injury Risk Assessment Protocol for Corrections (SIRAP-C) subscale scores. The SIRAP-C is a tool developed to assess the risk of self-injury in correctional populations based on a series of subscales for depressive symptoms, reasons for living, history of SDV, current suicidal thinking, family history of SDV, coping skills, and social connectedness (Cramer et al., 2022). This study contributes to our understanding of how SDV risk factors may vary based on age, race, and gender. This study also serves as an initial investigation of the SIRAP-C's applicability to these various groups. The target journal for study two is the *Journal of Forensic Psychology Research and Practice*.

Study Three

Study three is a secondary data analysis that examined the relationship between social connection with SDV and depressive symptoms among those incarcerated in the North Carolina state prison system. Indicators for social connectedness were identified across the SEM and placed in coinciding blocks of two hierarchical regression models to determine each level's predictive power regarding the outcomes of interest. I hypothesized that higher degrees of social integration would predict lower depressive symptom scores and a lower probability of an SDV event. I also hypothesized that lower degrees of social connection would predict higher depressive symptom scores and a greater probability of an SDV event. To my knowledge, no study has examined social connection across the SEM and the multilevel influence on SDV and

depressive symptoms for an incarcerated population. The target journal for this study three is *Criminal Justice Behavior*.

Significance

The proposed research is significant in several ways. First, study one synthesizes evidence regarding associations between social connection with depression and SDV among samples of individuals incarcerated in U.S. prisons. The study relies on the SEM to organize social connection constructs and provide a perspective of its multilevel nature. Study one contributes to our understanding of social connection in U.S. prison populations by identifying and examining relevant research regarding associations with SDV and depression. This helps to identify research gaps related to the nature of these associations. It also advances our knowledge of how social connection has been conceptualized and investigated among this population, which further informs our understanding of how different types of social connection may influence depression and SDV. The information provided by this review provides implications for research and practice, demonstrating the significance of social connection as a risk and protective factor and strategies to mitigate these outcomes.

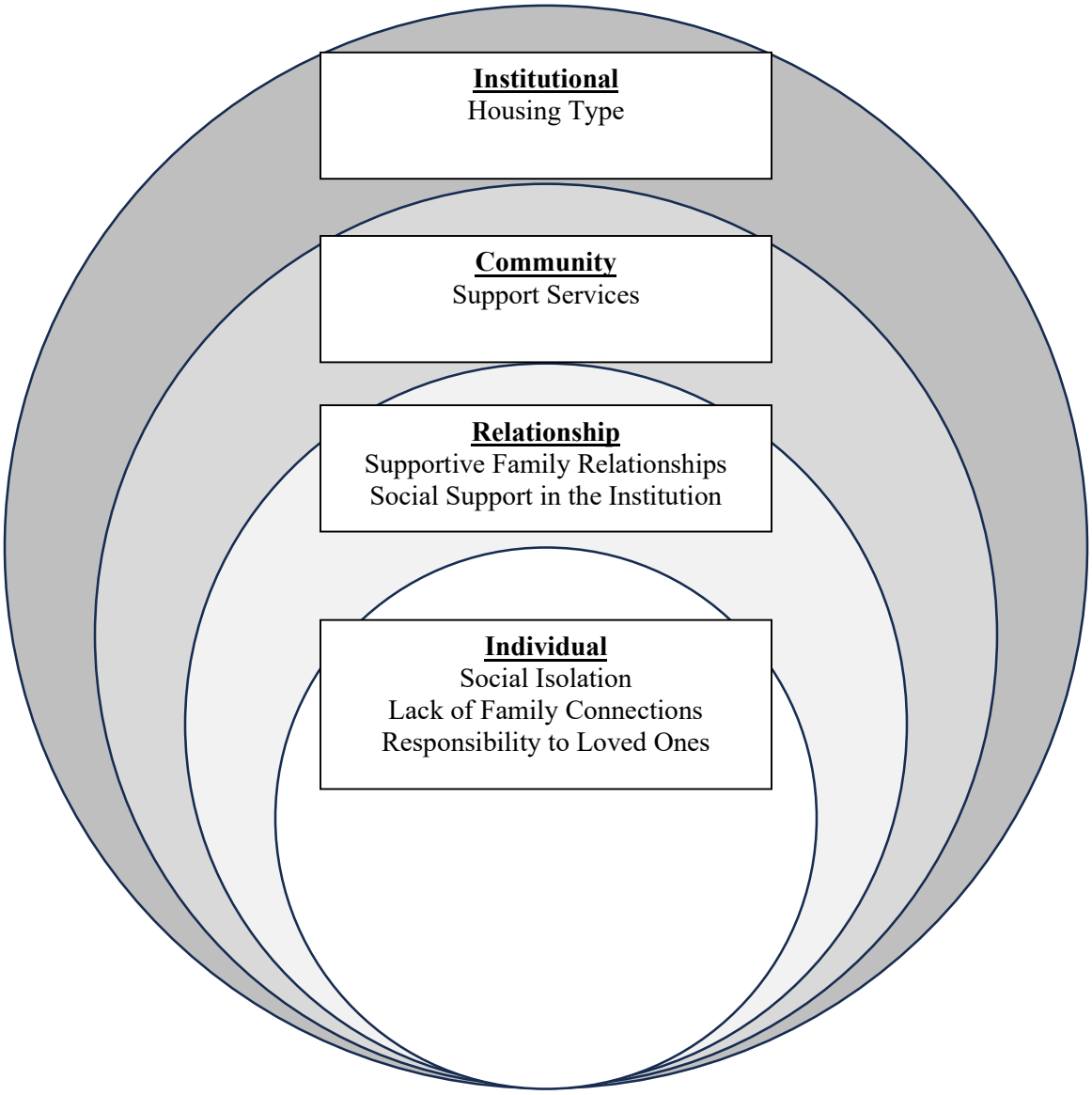
Next, the secondary analysis of the demographic variation in SIRAP-C subscale scores will be the first to examine demographic differences for this instrument. This instrument was developed to enhance clinician-administered SDV risk assessment methods in correctional settings (Cramer et al., 2022). This study will advance knowledge regarding the SIRAP-C's applicability to various subgroups within correctional settings and contribute to our understanding of age-, race-, and gender-based differences in SDV risk factors. Effective, efficient, and comprehensive SDV risk assessment tools are needed to aid in SDV prevention efforts, especially in correctional settings where SDV occurs at high rates (Carson, 2021a). The

multifaceted nature of SDV risk, combined with legal and safety considerations, can make correctional SDV assessment a challenging endeavor. This study provides some initial insights regarding the suitability of the first evidence-based and empirically evaluated SDV risk assessment tool of its kind.

Study three investigates the relationship between social connection, in the context of the SEM, with depressive symptoms and SDV events. Study three will contribute to the limited body of work that examines social connection and its association with SDV and depression in correctional settings. The prevalence of SDV and depression is high in correctional environments, yet these facilities are often inadequately prepared to address SDV events (Pope & Delany-Brumsey, 2016; H. P. Smith & Kaminski, 2011). The occurrence of SDV in correctional settings is harmful and costly, often consuming institutional resources, exposing staff and other incarcerated individuals to trauma, and creating disruption while posing a risk to the safety and the security of others (DeHart et al., 2009; H. P. Smith & Kaminski, 2011). This study provides insights regarding the impact of multiple levels of social connection and how these types of social connection may interact across the SEM. The status of social connection as a modifiable factor presents opportunities to utilize more socially-based interventions, particularly within correctional settings where many risk factors cannot be modified. Findings from study three have several clinical implications as they provide insights regarding the types of socially-based interventions that may effectively contribute to promoting social connection and mitigating depressive symptoms and SDV risk. This dissertation research seeks to help develop a foundation for our current understanding of social connection and socially-based programming in correctional settings and provide insights into how this may be utilized to prevent adverse physical and mental health outcomes.

Figure 1.1

A Social-Ecological Framework for Social Connectedness Within a Correctional Setting.



Note. Adapted from the National Center for Injury Prevention and Control, Division of Violence Prevention, (2002). *The Social-Ecological Model: A Framework for Violence Prevention*.

CHAPTER 2: SOCIAL CONNECTIVITY, SELF-DIRECTED VIOLENCE, AND DEPRESSIVE SYMPTOMS AMONG INCARCERATED PERSONS IN UNITED STATES PRISONS – A SYSTEMATIC REVIEW

Abstract

Objective: Adults incarcerated in United States prisons are adversely impacted by self-directed violence (SDV) and depression. Social connection is a key risk and protective factor that can be modified and improved to combat depression and SDV in prisons. Using the social-ecological model (SEM), this systematic review examines associations between multiple levels of social connection with depression, suicide ideation, and suicidal and non-suicidal SDV among the U.S. prison population.

Method: This systematic review followed PRISMA 2020 reporting guidelines. Article searches were conducted in Criminal Justice Abstracts, PsycINFO, Web of Science, and PubMed from database inception to January 2023. Covidence software was used for article screening and data extraction. Data was analyzed through narrative synthesis.

Results: Fifteen studies were included for review. Inverse associations were reported between loneliness with depression and suicide risk at the individual-level. Relationship-level evidence was mixed, as some studies reported that more social connection reduced depression and suicide ideation, and others reported no association. Community-level social connection appeared to protect against depression, though community-level associations were not investigated for SDV-related outcomes. At the institutional-level, restrictive housing, segregated housing, and duration of confinement, were associated with increased suicidal and non-suicidal SDV risk.

Conclusion: Social connection was linked to depression and SDV risk for this population at various levels of the SEM. Implementing socially based interventions to improve these outcomes may help mitigate these outcomes. Future research is needed to further examine how multilevel

social connection impacts depression, SDV, and suicide ideation for this population, specifically at the community-level.

Introduction

The United States has the highest rate of incarceration in the world (Fair & Walmsley, 2021), with approximately 1.2 million individuals incarcerated in prison facilities (Kluckow & Zeng, 2022). Suicide, the leading cause of unnatural deaths in U.S. prisons, accounts for 5-8% of all state and federal prison deaths (Carson, 2021). Social isolation is a well-known risk factor for suicidal and non-suicidal (i.e., self-injury), self-directed violence (SDV), and associated outcomes such as depression. Simultaneously, social connection serves as a modifiable protective factor against these outcomes, particularly for incarcerated individuals (Centers for Disease Control [CDC], 2022a; Favril et al., 2020; Van Orden et al., 2010; Zhong et al., 2021). As such, social connection may serve as a pathway of intervention for SDV and depression. This systematic review aims to explore the current literature regarding associations between social connection with suicidal and non-suicidal SDV, suicide ideation, and depression for those incarcerated in U.S. prisons.

Self-Directed Violence and Depression in U.S. Prisons

SDV is "behavior that is self-directed and deliberately results in injury or the potential for injury to one's death" (Crosby et al., 2011, p. 21). SDV may be suicidal, in which there is intent to inflict lethal harm (i.e., suicide attempt), or non-suicidal, where there is no intention of lethal harm, but deliberate destruction or alternation of body tissue occurs (i.e., self-injury; Crosby et al., 2011; Klonsky & Muehlenkamp, 2007). Suicide is a death resulting from SDV with the intention to die as a result (Crosby et al., 2011), and suicide ideation refers to "suicidal thoughts and ideas" (Harmer et al., 2024 Introduction section, para. 1). From 2001 to 2019, suicide

accounted for 6.4% and 4.8% of state and federal prison deaths, respectively (Carson, 2021). There is a higher rate of suicide in prisons compared to the general population (25 vs 22 per 100,000; Carson, 2021). The estimated prevalence of non-suicidal SDV in the U.S. correctional system is around 2% (Appelbaum et al., 2011; Smith & Kaminski, 2011), though it is likely underestimated, as 85% of systems have reported that non-suicidal SDV incidents occur weekly (Appelbaum et al., 2011).

Depression is a common mood disorder characterized by feelings of despair, hopelessness, loss of interest, and/or pleasure in activities for at least two weeks (National Institute of Mental Health [NIMH], 2023; World Health Organization [WHO], 2023). Prevalence estimates for current major depression in state prisons range from 9% to 29% (Prins, 2014). Those diagnosed with depression are at greater risk for suicidal (5 times) and non-suicidal SDV (9.3 times) compared to those who are not diagnosed (Favril et al., 2020; Zhong et al., 2021). Due to their high prevalence, it is critical to effectively address depression and SDV in U.S. prisons.

The Role of Social Connectedness

Social connectedness is the manifestation of the human need to belong (Baumeister & Leary, 1995). Failure to fulfill the need to belong (i.e., social exclusion or isolation) is associated with poorer mental and physical health, stress, and lower life expectancy (Baumeister & Leary, 1995; Haslam et al., 2015). Social isolation and lack of social support are some of the strongest and most reliable risk factors associated with SDV in prisons (Favril et al., 2020; Van Orden et al., 2010; Zhong et al., 2021); however, greater degrees of social integration (e.g., healthy and supportive interpersonal relationships, trusted social connections) act as protective factors against SDV and depression (CDC, 2022a; Choi et al., 2020; Maier et al., 2021; Wickramaratne

et al., 2022; Zhong et al., 2021). Meaning that the degree of social connectedness one experiences is uniquely situated to act as both a risk and protective factor for depression and SDV (CDC, 2022a; Favril et al., 2020; Van Orden et al., 2010; Zhong et al., 2021). Social connection is also modifiable in carceral and non-carceral settings and is likely an effective form of suicide prevention (Barker et al., 2014; Marzano et al., 2016).

Incarceration is inherently isolating, as the primary function of the prison facility is to physically separate those convicted of a crime from the public for purposes of punishment and public safety (Mackenzie, 2001). This physical separation has social consequences, such as less frequent contact with social connections due to restricted and regulated contact methods (Federal Bureau of Prisons, n.d.; Wagner & Jones, 2019). These social consequences occur across multiple domains and operate at various levels, indicating a need for a multilevel approach. To address this, we use an adapted four-level social-ecological model (SEM) based on models for violence prevention and suicide (CDC, 2022b; Cramer & Kapusta, 2017) and following principles of ecological models of health behavior, which assumes social connection exists and interacts across each level (Sallis et al., 2008).

The four levels of the SEM are individual, relationship, community, and institutional. Individual-level social connection is often conceptualized as social isolation - the absence of social contact or connection (CDC, 2022b; Dahlberg & Krug, 2006), or loneliness - the subjective feeling of being isolated or alone (CDC, 2021; National Academies of Sciences, Engineering, and Medicine, 2020). Relationship-level social connection refers to close interpersonal relationships with partners, family, or friends whose behaviors directly influence an individual's experiences (CDC, 2022b). This includes the presence of interpersonal relationships or the frequency and quality of social visits and social support. Incarceration often deprives

individuals of liberty, goods, services, intimate relationships, autonomy, and security (Dye, 2010; Paterline & Orr, 2016). Physical separation decreases the frequency and quality of previously established interpersonal relationships. This is compounded by the highly regulated, restricted, or costly methods available to contact or receive visits from those outside prison (Federal Bureau of Prisons, n.d.; North Carolina Department of Public Safety, 2021; Wagner & Jones, 2019). Those incarcerated may be forced to develop new connections or rely on lower quality pre-incarceration connections, leading to less social integration (i.e., reduced participation in social relationships, roles, and activities; Holt-Lunstad & Lefler, 2019)

Community-level social connection refers to social connections and interactions that occur within community settings and positive attachments to community organizations that provide programs and services (MacQueen et al., 2001; Wilson et al., 2012). Prisons, characterized by physical and social restrictions, are the communities in which social connections occur for those who are incarcerated. Community-level factors that may contribute to less social connection in prison include residing in authoritative and highly surveilled climates, overcrowding (lack of privacy and space), lack of access to formal support services (i.e., healthcare, substance use treatment), and few programming or work opportunities (Daniel & Fleming, 2006; Favril et al., 2020; Zhong et al., 2021). Establishing formal networks (e.g., employment, education, rehabilitative opportunities) while incarcerated promotes social connection at this level (Lafferty et al., 2016).

Social connection at the institutional-level involves societal factors, cultural norms, and formal relationships between support services and/or formal organizations from the general community (Dahlberg & Krug, 2006; CDC, 2013). In the context of incarceration, institutional social connection has been conceptualized as security level (i.e., maximum, minimum), solitary

confinement or administrative segregation, and single-cell occupancy (Favril et al., 2020; Zhong et al., 2021). Incarcerated individuals must assimilate or adjust to the prison facility's institutional norms, policies, and procedures (Haney, 2001; Paterline & Orr, 2016). Prison norms (i.e., culture or way of life) and policies are often determined by the facility's security level and housing placements. Placement in highly restrictive environments capitalizes on depriving aspects of prison environments, resulting in a lack of meaningful and positive social contact with interpersonal connections (Haney, 2018). Most suicides in prison occur in maximum-security settings or correctional inpatient hospitals, which are among the most restrictive, regulated, and surveilled correctional environments (Boren et al., 2018; Daniel & Fleming, 2006). Additionally, solitary confinement has been linked to chronic depression, deteriorated physical and mental health, self-harm, and suicidal ideations and behaviors (Haney, 2001, 2018).

The Current Study

Social connectedness has been identified as a critical risk and protective factor for SDV and depression for incarcerated people in the U.S. Yet, the extant literature examining these phenomena is limited. Past research often fails to investigate social connection as an exposure of interest for SDV among incarcerated samples or is limited to one level of the SEM. For example, prior systematic reviews examining SDV risk factors and suicidal and non-suicidal SDV in prisons reported that few studies (e.g., 6 out of 77) have examined this relationship (Zhong et al., 2021), or social connection was only accounted for at one level (Favril et al., 2020). Therefore, the primary research question for this review is as follows: what are the associations between social connectedness across each level of the SEM with SDV, suicide ideation, and depression for those incarcerated in U.S. prisons?

Methods

Search Strategy and Selection Criteria

A systematic literature review was conducted following Preferred Reporting Items for Systematic Reviews and Meta-analyses guidelines (PRISMA; Page et al., 2021). The search was performed using four electronic databases: Criminal Justice Abstracts, PsycINFO, Web of Science, and PubMed. Separate string searches (Appendix A) were conducted in each database for each outcome (depression, suicidal and non-suicidal SDV, and suicide ideation). Search results were uploaded into Covidence, a web-based systematic review software used to streamline screening and data extraction processes (Covidence, 2023).

Two reviewers (MM and ER) independently conducted the title and abstract screenings and full-text reviews to determine their relevance to the current research aim. Studies met inclusion criteria if peer-reviewed, written in the English language, occurred in the United States with adult participants (at least 18 years old), conducted primary data analysis, occurred in a state or federal prison system or setting, included a social connectedness indicator as an exposure, and included one of the identified outcome measures (depressive symptoms, self-injury, or suicide). Studies were limited to the U.S. because the U.S. incarcerates more often, for longer periods, with different standards of confinement compared to other countries (Johner, 2019; Subramanian & Shames, 2013). Studies were excluded if participants were not incarcerated at the time of the study.

Data Extraction and Synthesis

Data was independently extracted from all records by one reviewer (MM) using Covidence. The data extraction form (Appendix B) included (a) author and journal information; (b) research aims and hypotheses; (c) theory or conceptual framework (if applicable); (d) study

design; (e) participant and sampling information; (f) variables and measures; (g) statistical test used for analysis; (h) main findings; (i) and limitations.

Risk of Bias Assessment

The risk of bias for each study was independently assessed by two reviewers (MM and ER) using the Mixed Methods Appraisal Tool (MMAT) version 18 (Hong et al., 2018). The MMAT is a critical appraisal tool designed to examine empirical mixed methods research and was uploaded into Covidence's Quality Assessment Template. Studies were rated and scored based on the percentage of MMAT criteria met for each study design (e.g., 80%, 100%), and the resulting scores are reported.

Results

Risk of Bias in Studies

All studies met at least 80% of the MMAT eligibility screening criteria (Table 2.1). All but one study (n = 14) was cross-sectional and placed into the quantitative (non-RCT) category. One study used a mixed methods approach. Nine studies scored 100% on the MMAT criteria while six met 80% of the MMAT criteria.

Sample for Synthesis

As demonstrated in Figure 1, the initial search identified 912 records for possible inclusion. Duplicates (n = 422) were automatically removed by Covidence, resulting in 490 studies for title and abstract screening. Title and abstract screenings were conducted independently by two reviewers and assessed using Cohen's kappa (McHugh, 2012). In total, 409 records were excluded, and agreement at this stage was moderate (k = .63). Conflicts were discussed and resolved by both reviewers, resulting in 81 records for full-text review. Both reviewers independently conducted full-text reviews, resulting in the exclusion of 66 articles,

which were excluded for the following reasons: they took place outside the United States, were non-empirical studies, did not include a social connection indicator, and were not peer-reviewed. Inter-rater reliability was good (k = .97). In total, 15 studies were included in the final review (Table 2.1).

Results of Individual Studies

Study Sample Characteristics

Study-specific data are summarized in Tables 2.1 and 2.2. Studies were conducted between 1986 through 2022. All studies took place at one or multiple state prison facilities except for Koenig (1995). Seven studies examined incarcerated men only, five studies included incarcerated men and women, and four studies examined incarcerated women only. Sample sizes ranged from *n* = 26 to *n* = 864. Depression was included as an outcome in most studies (*n* = 10), followed by suicide and/or suicide ideation (*n* = 8) and non-suicidal SDV (e.g., self-injury; *n* = 2).

Results of Syntheses

Results of the syntheses for associations between the exposure and outcomes of interest are displayed in Table 2.2.

Individual-Level Associations

Depression. Two studies investigated the association between individual-level social connection and depression. Both studies reported a significantly positive association between loneliness and depression, as more loneliness was associated with higher depression scores and vice versa (Gallegos et al., 2021; Moore et al., 2021).

Self-Directed Violence. Two studies investigated the association between individual-level social connection with suicide and suicide ideation, and the findings were mixed. One study

reported that thwarted belongingness was not predictive of suicidal ideation in the absence of perceived burdensomeness; however, there was an indirect association between thwarted belongingness and suicide ideation via perceived burdensomeness (Mandracchia & Smith, 2015). One study reported that there was a significant association between loneliness and suicide ideation, as greater loneliness was associated with higher suicidality scores (Moore et al., 2021). Associations with non-suicidal SDV were not explored at this level.

Relationship-Level Associations

Depression. Seven studies investigated the association between relationship-level social connection and depression, and the findings were mixed. Four studies reported a significant and inverse association between relationship-level social connection (e.g., perceived social support, carceral trust, and satisfaction with social relationships) with depressive disorder or depressive symptoms (Archuleta et al., 2020; Moore et al., 2021; Koenig, 1995; Tadros et al., 2022). Alternatively, one study reported an indirect association between relationship-level social connection (e.g., parent-child involvement and closeness) and depression via loneliness (Gallegos et al., 2021). Higher-quality relationships were associated with experiencing less loneliness and, subsequently, less depression (Gallegos et al., 2021). Two studies reported that there was no association between relationship-level social connection (e.g., pseudo-family membership, social support, and visitation) and depression (Li et al., 2022; Wulf-Ludden, 2016). Overall, there is some evidence that relationship-level social connection protects against depressive symptoms, though this may depend on the type of social connection present.

Self-Directed Violence. Four studies investigated the association between relationship-level social connection and suicide or suicide ideation, and the findings were mixed. Two studies reported a significant and inverse association between relationship-level social connection (e.g.,

family and prison support, perceived social support) and suicide ideation (Dye & Aday, 2013; Richie et al., 2021). One study reported that perceived social support moderated the association between general and incarceration-specific stressful events and suicidality (Moore et al., 2021). This association was significant and positive for those who reported low perceived social support. One study found no association between social support or visitation and suicide ideation severity (Li et al., 2022). Associations between relationship-level social connection and non-suicidal SDV were not explored.

Community-Level Associations

Depression. Two studies investigated the association between community-level social connection and depression. Both studies reported significant inverse associations between community-level social connection (e.g., carceral network size and support from spiritual activities) and depression or depressive symptoms (Archuleta et al., 2020; Levitt & Loper, 2009). Associations with suicidal and non-suicidal SDV were not explored at this level.

Institutional-Level Associations

Depression. Two studies investigated institutional-level social connection and depressive symptoms. One study reported that prison norms were significantly and negatively associated with depressive symptoms (Archuleta et al., 2020). Another study reported that 25% of those held in Intensive Management Units (IMU), a form of solitary confinement, reported clinically significant ratings for depression. Those placed in IMU also stated in qualitative interviews that placement in those units resulted in feelings of social isolation and took a severe emotional toll on them (Reiter et al., 2020).

Self-Directed Violence. Three studies investigated associations between institutional-levels of social connection with suicide, finding significant associations between this level of

social connection with suicide risk. One study reported that placement in any type of segregated or single-cell housing was associated with significantly higher suicide rates compared to double-cell general population housing (Reeves & Tamburello, 2014). The relative risk for suicide in single-cell housing was over 400 times that of double-cell housing (Reeves & Tamburello, 2014), though rates differed based on the type of single-cell housing (i.e., detention vs protective custody). One study reported that less than a quarter (22%) of those placed in IMU had a documented suicide attempt (Reiter et al., 2020). The final study reported that the first two months of placement in restrictive housing units appeared to be a risk factor for suicide (Way et al., 2007).

Two studies examined the association between social connection at the institutional-level and non-suicidal SDV. One study reported that the majority of non-suicidal SDV incidents occurred in isolation cells where movement and activity are more restricted compared to prison generally (Jones, 1986). Another study reported that approximately 18% of those placed in IMU had documented an incident of non-suicidal SDV at some point during their incarceration (Reiter et al., 2020).

Discussion

This systematic review aimed to synthesize findings regarding associations between social connection with SDV and depression for people incarcerated in U.S. prisons. Fifteen studies reported on the associations between social connection and the outcomes of interest. The quality of all studies was acceptable, meeting at least 80% of MMAT criteria. Overall, findings for associations between various levels of social connection and depression and/or depressive symptoms were consistent across studies, demonstrating an inverse relationship. In contrast, findings regarding social connection and SDV were mixed.

Social Connection and Depression in Prisons

Findings from the reviewed studies show a significant association between social connection at each level of the SEM with depression or depressive symptoms. Higher levels of social connection were significantly associated with fewer depressive symptoms. These findings are consistent with prior evidence indicating that social connection (e.g., responsibility toward family, fear of social disapproval, social support) is protective of depression and/or depressive symptoms (Blazer, 2003; Malone et al., 2000). At the individual-level, research indicates that higher levels of loneliness are associated with higher levels of depression and worse remission among incarcerated and non-incarcerated populations globally (Brown & Day, 2008; Erzen & Çikrikci, 2018; Merten et al., 2012; Wang et al., 2018). This review also found support for significant associations between loneliness and depression and/or depressive symptoms, as two studies reported significant and positive relationships between loneliness and depressive symptom scores (Gallegos et al., 2021; Moore et al., 2021).

At relationship- and community-levels, prior evidence demonstrates that support, social cohesion, and social capital are determinants of depression for non-incarcerated samples (Remes et al., 2021; Wang et al., 2018). For example, a recent systematic review reported that less perceived social support was associated with greater symptom severity and poorer recovery for non-incarcerated adults with depression (Wang et al., 2018). In comparison, results from studies included in this review were mixed. Of the six studies examining associations between relationship-level social connection and depression, half determined that more social connection was significantly associated with fewer depressive symptoms (Archuleta et al., 2020; Moore et al., 2021; Tadros et al., 2022). The remaining studies reported either no association (Li et al., 2022, p. 200; Wulf-Ludden, 2016) or an indirect association in which one level of social

connection appeared to influence the other (Gallegos et al., 2021). For example, one study found that high-quality parental-child involvement (relationship) directly influenced loneliness (individual), which subsequently influenced depression (Gallegos et al., 2021), showing that external levels influence internal ones.

At the community-level, results from this review support a positive association between carceral network size and in-prison activity participation. At the institutional-level, prison norms were associated with depressive symptoms (Archuleta et al., 2020); however, associations between restrictive housing placements (i.e., solitary confinement, maximum security facility) and depression were not directly explored in the U.S. This is consistent with findings from a recent review, which concluded that there was a need for more research investigating the impact of solitary confinement on psychiatric symptoms (Luigi et al., 2020), reflecting a gap in the correctional literature. Overall, there is evidence that social connection at any level is potentially protective for depression for those incarcerated in U.S. prisons.

Social Connection and SDV in Prisons

Results were mixed regarding the association between social connection and SDV. Some findings showed support for the association between social connection with suicide and suicide ideation across some levels of the social-ecological model, and others reported no association. Prior evidence supports the strong association between social connection with suicide attempts and suicidal ideation, regardless of incarcerated status (Calati et al., 2019; Motillon-Toudic et al., 2022; Van Orden et al., 2010). Much of the research examining these associations among incarcerated samples does so at either the relationship or institutional-levels (e.g., no social visits, single-cell housing, or solitary confinement; Favril et al., 2020; Zhong et al., 2021). The results of this review are consistent with those findings as almost all studies examining an SDV

outcome (n = 11) included social connection at the relational (n = 4) or institutional (n = 5) levels.

Past research also shows that individual-level social connection (i.e., loneliness) is associated with indicators of suicidal behavior for incarcerated persons (Brown & Day, 2008), which is consistent with some of the findings regarding suicide risk (Moore et al., 2021). Additionally, these findings support significant inverse associations between relationship-level social connection (e.g., family/prison support) and suicide ideation (Dye & Aday, 2013; Richie et al., 2021). This aligns with prior work in which social disconnection from family and friends is an established factor for suicidal thoughts and behaviors among those incarcerated (Favril, 2021; Zhong et al., 2021). Indirect associations with suicide ideation and suicidality were also found at the individual and relationship levels (Mandracchia & Smith, 2015; Moore et al., 2021), suggesting that the consequences associated with interpersonal relationships (e.g., stress) or lack thereof may be offset by an interpersonal buffer (i.e., more social support). These findings may reflect how social connection may modify other risk factors for suicidal thoughts and behaviors (e.g., perceived social support modifies stress).

Most studies examined social connection and SDV at the institutional-level, finding that low institutional social connection is associated with increased risk of SDV. These results are consistent with prior work, which demonstrates that restrictive placements (e.g., solitary confinement, maximum security) are consistently associated with an increased risk of SDV compared to other housing types (Dye, 2010; Haney, 2018; Kaba et al., 2014). Prior research also shows that length of stay may amplify the experience of isolation and is associated with an increased risk of SDV (Haney, 2018; Kaba, 2014), which is consistent with the results of this review. Non-suicidal SDV was only examined at the institutional-level, with studies reporting an

association between non-suicidal SDV and placement in restrictive settings. This aligns with evidence from two national studies reporting that the highest rates of non-suicidal SDV in prisons occur in maximum-security and lockdown units (Appelbaum et al., 2011; Smith & Kaminski, 2011).

Implications for Research and Practice

Overall, there was a lack of research investigating associations between individual-, relationship-, and community-level social connection with non-suicidal SDV as well as between community-level social connection with suicidal SDV and suicide ideation. There is a need for future research exploring these associations. The nested and multilevel nature of social connection was evidenced by reports of a moderating effect of one level of social connection to another; however, few studies investigated social connection at multiple levels. Future research may benefit from using conceptualizations encompassing multiple levels of social connection (i.e., social capital) or testing distinct constructs at multiple levels accounting for the multidimensional and nested nature of social connection (Ehsan et al., 2019). Though this may be challenging, as singular concepts of social connection may also be multidimensional. For example, it is argued that the construct of loneliness is comprised of two dimensions - social and emotional loneliness (Wang et al., 2018; Weiss, 1975). Yet each dimension of loneliness is the consequence of different dimensions of social connection at the relationship-level. It is postulated that social loneliness stems from the absence of relationships, and emotional loneliness from the absence of close emotional attachment (Wang et al., 2018; Weiss, 1975). The multidimensionality of singular constructs may further complicate how aspects of social connection are defined and measured.

These findings also serve as evidence of the protective capabilities of social connection at the relationship and community-levels against SDV and depression within prison settings. Social connection is uniquely capable of increasing or decreasing risk for these outcomes. Identifying, establishing, and utilizing forms of social connection should be a key component of any intervention targeting SDV or depressive symptoms. Correctional systems need affordable, evidence-based interventions capable of effectively utilizing staff and resources while reducing depression and/or SDV. Two potential avenues of intervention that take place at the relationship and community-levels include Caring Contacts and interpersonal psychotherapy (IPT).

Caring Contacts is a simple and low-cost suicide prevention strategy that has demonstrated efficacy among medical and psychiatric inpatients, military personnel, and veterans (Motto, 1976; Reger et al., 2017; Skopp et al., 2023). This intervention fosters relationship-level social connection as it involves routinely sending personalized text-based communication expressing concern for the well-being of those with high suicide risk (Motto, 1976; Reger et al., 2017; Skopp et al., 2023). This program may be easy to develop in correctional settings, especially because systems for receiving and sending letters and messages already exist.

IPT is an evidence-based short-term treatment program for major depressive disorder that focuses on four areas of interpersonal crises (e.g., interpersonal disputes, change in life circumstances, grief, and social isolation) an individual may be facing which are identified as a proximal trigger for depressive episodes (Johnson & Zlotnick, 2008; Johnson et al., 2019). Prior reviews have also found support for the use of IPT to treat depression (Cuijpers et al., 2016), with some indicating that IPT may be more effective than cognitive behavioral therapy (de Mello et al., 2005). There is also evidence of the efficacy of IPT in correctional settings, specifically for

depression and hopelessness (Johnson et al., 2019; Johnson & Zlotnick, 2008, 2012). Additionally, IPT has been an effective treatment for suicide ideation among non-incarcerated adults with depression (Heisel et al., 2009, 2015; van Bentum et al., 2021).

Finally, restrictive housing placements (i.e., solitary confinement) and single-cell occupancy at the institutional-level are well-established risk factors for SDV in correctional environments (Favril, 2021; Favril et al., 2020; Haney, 2018), which is supported by the findings of this review. Rather than promoting social connection, possible interventions for restrictive housing practices should prioritize reducing physical and social isolation. For example, longer durations of confinement were associated with greater suicide risk (Way et al., 2007), suggesting that shorter durations of confinement may help combat this risk (Digard et al., 2018). Other recommendations include utilizing SDV risk assessments, reducing the use of solitary confinement to specific incidents (i.e., violent behavior), clinician consultation prior to transitions from restrictive housing to the general population (Daniel, 2006; Digard et al., 2018), and the implementation of alternative practices such as therapeutic diversion units (Digard et al., 2018; North Carolina Department of Public Safety, 2020) or residential treatment programs (Colorado Department of Corrections, 2021; Digard et al., 2018) for those with mental health treatment needs.

Most studies located for this review were cross-sectional in nature and limited conceptualizations of social connection to one level. It is likely that actual or perceived social connection fluctuates over time, implying a need for longitudinal research. The lack of research investigating multiple-level social connections may indicate that there are aspects of social connection that have not been explored but are contributing to these associations. This provides another avenue of research necessary to adequately explore the true nature of these associations.

Additionally, there is a need for more research investigating family support, specifically for men. Only one study explored this and found that greater perceived familial support was associated with experiencing fewer depressive symptoms (Tadros et al., 2022), underscoring the need for more research regarding this topic. Finally, there were very few studies that investigated community-levels of social connection. This may speak to the limited use of socially based programs and activities in correctional settings. There is a need for more investigations of community-level social connection, including its various forms and its influence on these outcomes.

Limitations

There are several limitations to this study. First, this search was not exhaustive as grey literature was not included, and the search was not expanded by reviewing the reference lists of the studies located for review. Additionally, this review relied on a limited number of databases to identify eligible studies. Next, systematic reviews are potentially susceptible to selection or publication bias, which may lead to underestimation of the results or the failure to locate studies with results of clinical, though not statistical, significance (Garg et al., 2008; Mohseni et al., 2022). Finally, this study did not include all correctional settings (e.g., jail) and cannot be used to assert these associations in settings other than U.S. prisons.

Conclusions

This systematic review examined the current state of the literature regarding the associations between social connection with SDV and depression among incarcerated samples in U.S. prisons. The evidence here primarily supports direct associations between social connection with SDV and depression, with the absence of social connection often acting as a risk factor for the outcomes. The findings also speak to the nested nature of social connection and the multiple

dimensions encompassed in individual constructs. Implications and directions for future research include examining constructs of social connection at multiple levels, longitudinal studies examining these associations, and implementing socially based interventions.

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Table 2.1

Study Characteristics and Conceptualizations of Social Connection Placed on the Social-ecological Model

		Social Connectedness Domain				Outcomes of Interest		
Study	**Social Connectedness Concept**	**Individual**	**Relationship**	**Community**	**Institutional**	**Suicidal SDV Or Ideation**	**Non-suicidal SDV**	**Depression**
Archuleta et al., 2019	Social Capital	--	x	x	x	--	--	x
Dye & Aday, 2013	Prison Support Family Support	--	x	--	--	x	--	x
Gallegos et al., 2021	Parental/Child Closeness Parental/Child Involvement Loneliness	x	x	--	--	--	--	x
Jones, 1986	Isolation via Solitary Confinement	--	--	--	x	--	x	--
Koenig et al., 1995	Social Support	--	x	--	--	--	--	x
Levitt & Loper, 2009	Spiritual activity participation & support Perceived support from non-religious activities	--	--	x	--	--	--	x
Li et al., 2022	Social Support Visits	--	x	--	--	x	--	x

Table 2.1 *(Continued)*

Study Characteristics and Conceptualizations of Social Connection Placed on the Social-ecological Model

Mandracchia & Smith, 2015	Thwarted Belongingness	**x**	**--**	**--**	**--**	**x**	**--**	**x**
Moore et al., 2021	Loneliness Perceived Social Support	**x**	**x**	**--**	**--**	**x**	**--**	**x**
Reeves & Tamburello, 2014	Segregated and Single-cell Housing	**--**	**--**	**--**	**x**	**x**	**--**	**--**
Reiter et al., 2020	Intensive Management Units (Solitary Confinement)	**--**	**--**	**--**	**x**	**x**	**x**	**x**
Richie et al., 2021	Perceived Social Support	**--**	**x**	**--**	**--**	**x**	**--**	**--**
Tadros et al., 2022	Social/Family Support	**--**	**x**	**--**	**--**	**--**	**--**	**x**
Way et al., 2007	Special Disciplinary Housing	**--**	**--**	**--**	**x**	**x**	**--**	**--**
Wulf-Ludden, 2016	Belonging to a pseudo-family	**--**	**x**	**--**	**--**	**--**	**--**	**x**

Table 2.2

Study Characteristics: Constructs, Measures, and Relevant Findings

Study and Location	Design and Sample	Social Connectedness Construct and Variable Information	Measurement of Outcome	Relevant Findings
Archuleta et al., 2020 *Kentucky Prisons* **MMAT Score:** 80	**Cross-sectional Study** Incarcerated Men (Older Adults) N = 91 M_{age}= 55.70 years (range 45-54 years) *Race/ethnicity not reported*	**Social Capital:** **Definition:** "the socio-structural resources (e.g., emotional or instrumental support) that accrue through shared norms and values within durable relationships;" "may be cognitive (e.g., trust) or linked to network structure (e.g., network size and composition" (p. 25) **Measures:** 1. General carceral trust: Participants' reported level of trust in other individuals with whom participants were currently incarcerated 2. Total number of people with whom participants were incarcerated that provided some form of support	**Depressive Symptoms:** DSM-IV Criteria for Major Depression and other Depressive disorders	1. In bivariate analyses, lower trust ($p<.05$), smaller network size ($p<.01$), carceral norms ($p<.05$) and less satisfaction with social relationships ($p<.01$) were significantly associated with higher depressive symptoms. 2. Higher trust was not significantly associated with depression when controlling for other variables in the initial HLM model. A smaller carceral network size ($p<.01$) and satisfaction with social relationships ($p<.05$) was significantly associated with more depressive symptoms. 3. After the addition of the interaction term (trust x chronic health conditions) in the second HLM model, results demonstrated that higher trust

Table 2.2 *(Continued)*

		3. 1-item to evaluate understanding of prison norms or ways of life 4. Modified WHOQOL-BREF (3-item social relationships domain)		(p<.05) was significantly associated with fewer depressive symptoms when included with the additional measures of social capital (e.g., carceral network size and satisfaction with social relationships) which remained significant.
Dye & Aday, 2013 *State Prison (Southern)* **MMAT Score:** 100	**Cross-Sectional Study** Incarcerated Women N = 214 M_{age} = 41.4 years 46.0% Black	**1. Prison Support** **Definition:** Unspecified **Measure:** 15-item "yes/no" questions (ex: "I have fellow inmates here who I can depend on"; Range: 0-13) **2. Family Support:** **Definition:** Unspecified **Measure:** Frequency with which respondents received letters, phone calls, and visits from family. Responses summed. Higher scores indicate more family support (Range 0-9).	**Suicide Attempts:** "Have you ever attempted suicide?" (Y/N) **Current Suicide Ideation:** Likert-type prompt "During the past few weeks, have you thought about ending your life?" **Pre-prison Suicide Ideation:** Constructed based on the cross-tabulation of responses to questions regarding pre-	1. Current suicide ideation was characterized by high levels of depression, worse prison adjustment, and a lack of family and prison support. 2. Significant differences in ideation were found for mental health rating, depression, hopelessness, history of mental health treatment, abuse history, prison adjustment and education. Women in the "pre-prison and current ideation" and "current ideation only" groups reported significantly higher depression scores and worse prison adjustment. 3. The multinomial logistic regression demonstrated that the strongest predictors of both pre-prison and current suicide

Table 2.2 *(Continued)*

			prison and current suicide ideation. **Current Depression:** Modified Hopkins Symptom Checklist	ideation (compared to no ideation ever) were depression, history of mental health treatment, abuse history, prison adjustment, family support, prison support, and education level. 4. Higher scores on the depression scale significantly increased the odds of "pre-prison" and "current ideation" as well as "current ideation" only versus "no suicide ideation ever." 5. Those with more family support were less likely to be in the "current ideation only" group compared to the "no ideation ever" group.
Gallegos et al., 2021 *State Prison (Southern)* **MMAT Score:** 100	**Cross-sectional Study** Incarcerated Women w/ at least one child N = 121 M_{age} = 38.9 years (range 22 to 64 years) 49.6% white; 42.1% Black	**1. Perceived parent-child closeness** **Definition:** part of the quality of relationships; how close parents feel to their child **Measure:** 4-item scale developed by authors; assessed frequency of feeling psychologically close to the	**Depression:** 7-item subscale of the Hospital Anxiety and Depression Scale	1. Parent-child closeness demonstrated a significant and indirect (via loneliness) relationship with depression ($p<.05$). Showing that more closeness was associated with reduced loneliness and, subsequently, lower depression scores.

Table 2.2 *(Continued)*

		child and positive appraisal of the relationship with the child **2. Parental Involvement** **Definition:** part of quality of relationships; how involved a parent feels in their child's lives **Measure:** Alabama Parenting Questionnaire Involvement Scale **3. Loneliness** **Definition: "**perceived discrepancy between desired and achieved social contact" (p. 2) **Measure:** 20-item (UCLA) Loneliness Scale		2. Parental involvement demonstrated a significant indirect association (via loneliness) with depression ($p<.05$). Showing that more involvement was associated with reduced loneliness and, subsequently, lower depression scores.
Jones, 1986 *Virginia* **MMAT Score:** 80	**Cross-sectional Post-hoc Comparison Design** Incarcerated Men and Women N = 135 Group[1] (n = 67) M_{age} = 30, 6% female 69% white	**Isolation/Segregation via Solitary Confinement** **Definition:** Condition of intense sensorimotor or social deprivation	**Self-injury:** Occurrence of self-injury	1. Self-injury was more likely to occur in restrictive settings (e.g., medium/maximum security prisons), demonstrating the influence of the restrictiveness of the prison environment on SI. Just over half (51%) of incidents

Table 2.2 *(Continued)*

	Group[2] (n=68) M_{age} = 31 years 6% female 34% white	**Measure:** whether the individual was placed in solitary confinement at the time of self-injury		occurred in segregation or isolation cells, and a quarter occurred in prison psychiatric units.
Koenig et al., 1995 **North Carolina* **MMAT Score:** 100	**Cross-sectional Study** Incarcerated Men ≥ 50 years old N = 95 M_{age} = 57 years 70% white	**Social Support** **Definition:** Not provided **Measure:** assessed during baseline evaluation; no additional information was provided	**Depressive Disorder:** Diagnostic Interview Schedule (DIS)	1. Incarcerated persons with a psychiatric disorder were more likely to report less social support than those without one. 2. Impaired social support was identified as one of the strongest correlates of a psychiatric disorder in the logistic regression model.
Levitt & Loper, 2009 *State Prison Facility* **MMAT Score:** 100	**Cross-sectional Study** Incarcerated Women N = 213 M_{age} = 33.34 years 56% Black	**1. Spiritual Participation & Support** **Definition:** not specified **Measure:** 2 self-report items – "Do you participate in spiritual activities in prison?" and "I get (No, Low, Moderate and High) support from my spiritual activities inside prison." **2. Perceived support from nonreligious activities**	**Depression:** Beck Depression Inventory (BDI)	1. Significant differences were found in depression scores between those who did not attend spiritual activities and those reporting high support from spiritual activities ($p<.05$). Those reporting high support were more likely to report lower BDI scores than non-attendees.

Table 2.2 *(Continued)*

		Measure: Likert scale item for perceived level of support from educational, work, and recreational activities		
Li et al., 2022 *Connecticut Dept of Corrections* **MMAT Score:** 100	**Cross-sectional Study** Incarcerated Men ≥50 years old N = 65 M_{age} =56.6 51% Black, 40% white, 9% Hispanic/other	**Social Support** **Definition:** not specified; discusses importance of maintaining social ties while incarcerated **Measure:** 7-item survey adapted from the Medical Outcomes Study (MOS) Social Support Survey and the MPSS **Visitation** **Description:** whether others came to see the participant **Measure:** Frequency of visitations; who visits the most often; difficulty arranging visits	**Suicide Ideation:** 31-item Geriatric Suicide Ideation Scale (GSIS) **Depression Symptom Severity:** 9-item Patient Health Questionnaire (PHQ-9)	1. Visitation and social support were not significantly associated with any physical function or mental health indicators. This study was not able to verify if the worse health outcomes for those serving life sentences was associated with lower social support due to the small sample size.
Mandracchia & Smith, 2015 *Mississippi*	**Cross-sectional Study** Incarcerated Men N = 399	**Thwarted Belongingness:** **Definition:** Subjective feeling state in which the basic need	**Suicide Ideation:** Beck Scale for Suicide Ideation (BSS)	1. When controlling for depression and hopelessness, perceived burdensomeness (PB; $p<.001$) predicted suicide

Table 2.2 *(Continued)*

MMAT Score: 80	M_{age} = 34.94 years (range: 19 to 69 years) 55.1% Black, 36.1% white	for affiliation goes unmet (individual does not experience close relationships that involve reciprocal care and concern). **Measure**: The Interpersonal Needs Questionnaire	**Depressive Symptoms:** Center for Epidemiological Studies-Depression Scale (CES-D)	ideation, but thwarted belongingness (TB; $p < .955$) did not. 2. Consistent with the main hypothesis, suicide ideation was strongest among those who reported higher levels of both TB and PB. The interaction between TB and PB was significant when controlling for depression and hopelessness, as the relationship between PB and suicide ideation was strongest for those who indicated high thwarted belongingness.
Moore et al., 2021 *Rhode Island/Massachusetts Prison Facilities* **MMAT Score:** 100	**Cross-sectional Study** Incarcerated Men and Women N = 160 M_{age} = 40 years (range 18-65 years) 70% male 62.5% white	**Loneliness** **Definition:** One's subjective feelings of loneliness and feelings of social isolation **Measure:** UCLA Loneliness Scale (UCLA-LS) **Perceived Social Support** **Definition:** not specified **Measure:** MSPSS	**Depressive Symptoms:** Hamilton Rating Scale for Depression (HRSD); The Quick Inventory of Depressive Symptomatology (QIDS) **Suicidality:** Beck Scale for Suicidal Ideation (BSI)	1. There was a significant negative main effect of social support across all MLR models. Social support did not moderate the relationship between stressful life/incarceration-specific stressful events with depression symptoms, hopelessness, or loneliness. 2. Experiencing more incarceration-specific stressful events, specifically those that were interpersonal in nature, was significantly associated

Table 2.2 *(Continued)*

				with increased loneliness and greater suicide risk. The interaction of stress x social support was significantly associated with suicidality (p=.019) as stressful life events were only significantly associated with suicidality for those who reported low perceived social support.
Reeves & Tamburello, 2014 *New Jersey Dept. of Corrections* **MMAT Score:** 80	**Cross-sectional Study** Incarcerated Men and Women N = 26 *Demographic Information not reported*	**Segregated/Single-Cell Housing** **Definition:** Disciplinary Housing; Housing outside of the prison's general population **Measure:** Tallied all housing locations other than "General Population" that were also single-cell units	**Suicide:** Calculated the suicide rate for those in segregated/single-cell housing relative to the rate of those in general population double-cell housing.	1. Double-cell general population (GP) housing had a suicide rate of .9 incarcerated persons per 100,000 beds per year. Every single-cell housing arrangement apart from the stabilization unit had a significantly higher suicide rate than double-cell GP. 2. Suicide rates per 100,000 for segregated/single-cell housing were as follows: single-cell detention (374), single-cell protective custody (315), single-cell infirmary (122), single-cell ad-ministrative segregation (93), and single-cell inpatient (60). 3. Overall, the relative risk of suicide in single-cell detention

Table 2.2 *(Continued)*

				was over 20-fold the risk of suicide in the overall prison system and over 400-fold the risk of those in double-cell GP.
Reiter et al., 2020 *Washington State Department of Corrections* **MMAT Score:** 80	**Mixed Methods** Incarcerated Men N (Initial group) = 106 N (Follow-up group) = 80 M_{age} = 35 years 42% white, 23% Latino, 23% other	**Intensive Management Units (IMU)** **Description:** units that hold those who have usually violated an in-prison rule and are placed in solitary confinement; characterized by highly restricted access to tv's, phones, radios, time out of cell, and visitors **Measure:** Part of the inclusion criteria is that participants must be housed in this unit	**Self-harm/Suicide Attempt:** documented suicide attempt or self-harm from provided administrative health data **Depression:** included in the Brief Psychiatric Rating Scale (BPRS)	1. Administrative data showed that 19% had serious mental illness designations, 22% had a documented suicide attempt and 18% had documented self-harm at some point during incarceration; About 25% of the sample reported clinically significant ratings for depression and anxiety symptoms. 2. Most reported that the IMU had a severe emotional toll (80%), and they experienced feelings of social isolation (73%)
Richie et al., 2021 *State Prisons (Northeastern)* **MMAT Score:** 100	**Cross-sectional Study** Incarcerated Men and Women N = 169 M_{age} = 39 years (range 18-65 years) 33.7% female 44.6% minority	**Perceived Social Support** **Definition:** not specified **Measure:** MSPSS	**Suicidal Ideation:** Beck Scale for Suicidal Ideation (SSI)	1. Results demonstrated a significant relationship between perceived social support (PSS) and the risk of current suicidal ideation (SI). As PSS increased, the risk of SI decreased by 5% ($p<.001$). 2. In the final adjusted multivariate model, each unit increase in PSS was

Table 2.2 *(Continued)*

				significantly associated with a 4% drop in risk of SI when controlling for other significant demographic, clinical, and criminological risk factors (p<.001). Overall, higher perceived social support was significantly associated with a lower likelihood of suicidal ideation.
Tadros, 2022 *Indiana, Ohio, Minnesota, New Jersey, and New York* **MMAT Score:** 100	**Cross-sectional Study** Incarcerated Men and Non-incarcerated female partners N = 864 couples 49.77% Black, 25.23% white, 21.18% interracial	**Familial Social Support:** **Definition:** how the individual currently feels about their relationships with family members other than their identified partner and focal child **Measure:** Extended family support scale - Series of 6 questions capturing how respondents currently feel about their relationships with family members other than their identified partner and focal child	**Depression:** 9-item Center for Epidemiologic Studies Depression Scale (CES-D)	1. For both incarcerated men and their female partners, greater perceived familial social support was significantly associated with fewer depressive symptoms. For men, this relationship was significant at (p<.001).
Way et al., 2007 *New York* **MMAT Score:** 100	**Cross-sectional (Descriptive)** Incarcerated adults who died by suicide N = 32	**Single Cell Special Housing Unit** **Definition:** type of prison housing that involves	**Suicide:** whether an individual died by Suicide	1. Thirty-two inmates died by suicide in a special housing cell in the 11-year period from 1993 to 2003. The median number of days in a special housing cell

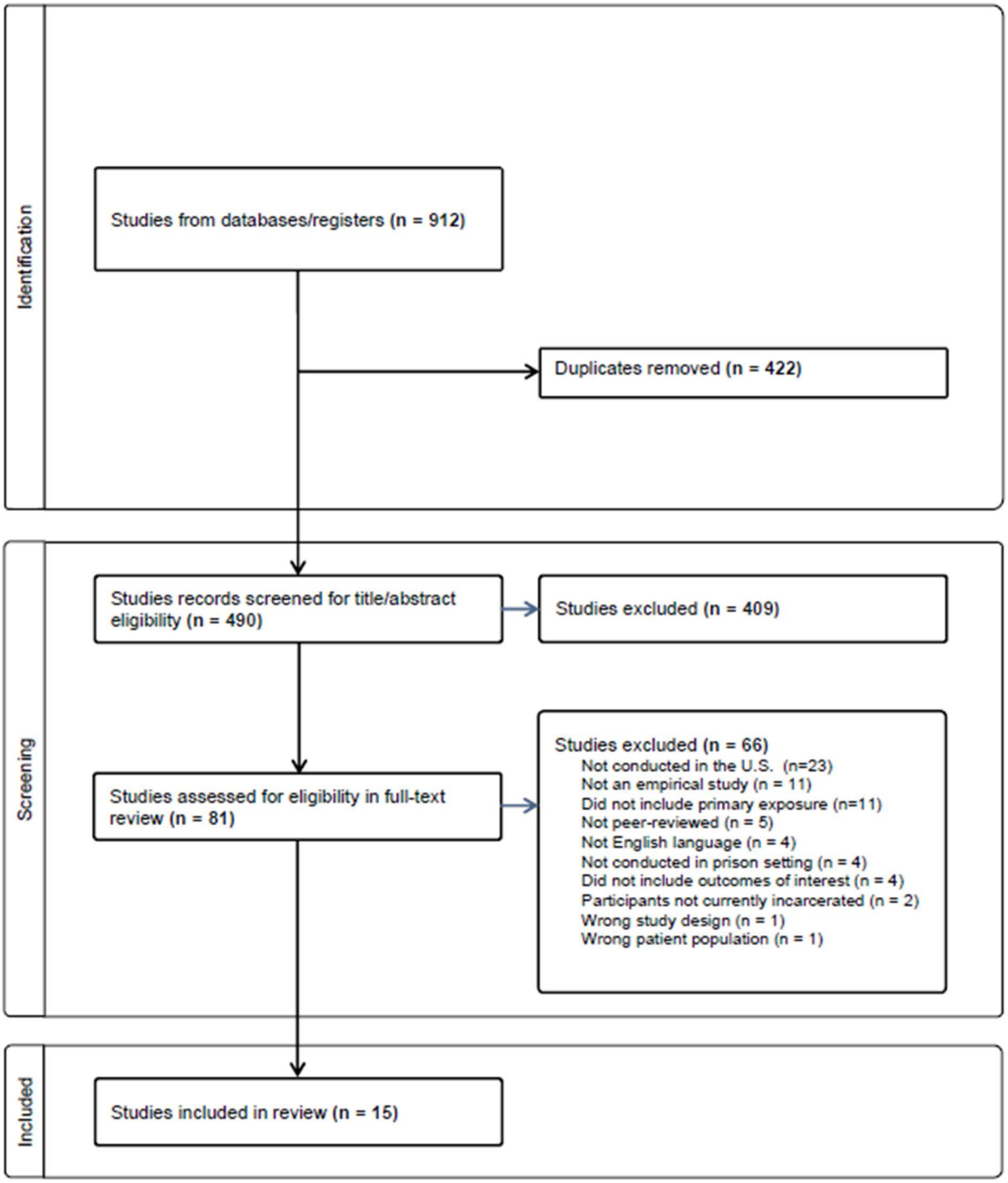
Table 2.2 *(Continued)*

	Demographic Information not reported	isolation with limited social contact **Measure:** Total number of days in the special housing unit before suicide and the length of aggregate disciplinary sentence the individual was serving		before suicide was 63, with a mean±SD of 382±790days (range of zero to 2,977 days).
Wulf-Ludden, 2016 *Fluvanna Correctional Center for Women in Virginia* **MMAT Score:** 80	**Cross-sectional Study** Incarcerated Women N = 216 M_{age} = 33.49 years 62.9% white, 37% non-white	**Pseudo families** **Definition:** close relationships among female inmates that mimic actual kinship networks; inmates consider one another to be family and treat one another as family. **Measure:** Participants were asked "yes/no" questions about their relationships with other incarcerated individuals, including whether they were part of a pseudo-family (i.e., "There is someone at the prison who is like a mother to me.")	**Negative Affect (Depression):** Beck Depression Inventory	1. Regardless of pseudo-family membership, there was a significant positive relationship between strain and depression ($p<.001$). The association between pseudo-family membership and depression was not significant in the OLS regression.

Note. *Took place in a federal prison

Figure 2.1

Study Selection − Systematic Review PRISMA Flow Diagram



Appendix A

Boolean search string for all terms

Term	Search String
Social Connection	(social connect*) OR (social isolation) OR (social support) OR (belonging*)
Depression	AND (depression) OR (depressive disorder) OR (depressive symptoms) or (major depressive disorder)
Suicide or suicidal SDV	AND (suicide*) OR (suicidal behavior) OR (suicidal ideation) OR (suicidal thoughts) OR (suicide attempts) OR (suicide risk). For non-suicidal SDV
Self-injury or non-suicidal SDV	AND (self harm) OR (self harming) OR (self injury) OR (self injurious behavior) OR (non-suicidal self-injury) OR (nssi) or (non-suicidal self-harm).
Prison	AND (prison) or (incarceration) or (imprisonment) or (correction facilities).

Appendix B

Abbreviated Version of Data Extraction Template

Author, Year	Aims/Research Question	Study Design	General Sample Description	Conceptualization of Social Connection
Archuleta et al., 2019	1. Explore relationships among cognitive and structural facets of social capital, chronic health conditions, and depressive symptoms 2. Identify the role of social capital alongside chronic health conditions as a determinant of depressive symptoms	Cross-sectional Study	Drawn from a larger, mixed-method study of older adults in Kentucky prisons ($N = 5$)	Social Capital
Dye & Aday, 2013	1. To what extent do women serving life sentences report thoughts of suicide and suicide attempts? 2. To what extent were thoughts of suicide evident before incarceration? 3. To what extent do women serving life sentences currently think about ending their own lives? 4. In what ways are pre-prison victimization, prison adjustment factors, prison and family supports, mental health factors, and time served associated with suicide thoughts? 5. How do these relationships differ given pre-prison versus current suicide ideation?	Cross-sectional Study	Women serving life sentences in three prisons in a southern state	1. Prison Support 2. Family Support
Gallegos et al., 2021	To examine the influence of parent-child relationships on the health of incarcerated women	Cross-sectional Study	Incarcerated female adults who have at least one child	1. Perceptions of parent-child closeness 2. Parental-involvement

CHAPTER 3: EXAMINING DEMOGRAPHIC VARIATION IN THE SELF-INJURY RISK ASSESSMENT PROTOCOL FOR CORRECTION

Abstract

Purpose: The Self-injury Risk Assessment Protocol for Corrections (SIRAP-C) is a clinical and evidence-based self-directed violence (SDV) risk assessment tool for correctional settings. The SIRAP-C has been empirically evaluated but has yet to be examined for its applicability across various groups. This study seeks to examine demographic variation in the SIRAP-C subscales.

Method: The North Carolina Department of Adult Corrections (NC DAC) provided data from the fourth quarter of 2016 to the first quarter of 2020 consisting of medical records and SDV risk assessment documentation. Correlations, one-way analysis of variance (ANOVAs) tests, and independent sample-t-tests were used to examine age-, race- , and sex-based variations in SIRAP-C subscale scores.

Results: Meaningful race-based variations emerged for depressive symptoms and potentially meaningful race- and gender-based variations were found for history of SDV. No meaningful variations emerged for age.

Conclusions: The SIRAP-C appears to be applicable across groups of varying characteristics.

Introduction

The U.S. has the largest incarcerated population in the world (Fair & Walmsley, 2024). Individuals who have been incarcerated often experience harsh physical and mental health disparities (Brinkley-Rubinstein, 2013). This population suffers a disproportionate burden of self-directed violence (SDV; Carson, 2021b), and the U.S. correctional system has been identified as a key domain in aiding the reduction of suicide across the country (American Foundation for Suicide Prevention, 2021). Validated clinically-based risk assessments are critical

to identifying those most at risk for suicidal and non-suicidal SDV; however, there are limited tools that are available for or tested in correctional populations (Cramer et al., 2022; National Commission on Correctional Health Care [NCCHC], 2019). Additionally, there is evidence that factors associated with SDV may vary based on certain demographic characteristics such as age, race, and sex (Favril, 2021; Favril et al., 2020; Fazel et al., 2008; Zhong et al., 2021). This study aims to examine the applicability of a clinically based SDV risk assessment tool by investigating differences in assessment scores based on demographic characteristics.

SDV refers to intentional or unintentional "behavior that is self-directed and deliberately results in injury or the potential for injury to oneself" (Crosby et al., 2011, p. 21), including suicide and self-injurious behavior. Suicide is a primary public health concern, as it is the second leading cause of death in correctional facilities (Carson, 2021a; Mumola, 2005). From 2001 to 2019, suicide accounted for 6.4% (n = 4,183) of deaths in state prisons and 4.8% (n = 342) of deaths in federal prisons (Carson, 2021a). The estimated prevalence of SDV in U.S. state correctional facilities is 2.4% (Smith & Kaminski, 2011) and < 2% in state and federal prison systems (Appelbaum et al., 2011); however, this is likely underestimated as evidence suggests almost a third of those incarcerated engage in SDV, and SDV events occur every week in most systems (Appelbaum et al., 2011; Smith & Kaminski, 2011).

There are various static (i.e., unchanging) and dynamic (i.e., may change) risk factors associated with SDV across demographic, historical, criminological, and clinical domains. Incarcerated individuals often experience or are exposed to risk factors strongly associated with suicidal behavior at higher rates than the general population (Favril, 2021; Favril et al., 2020; Zhong et al., 2021). These risk factors include a history of SDV, current suicidal ideation or psychiatric diagnosis, as well as other internal (i.e., psychosocial) and external factors (i.e.,

prison environment; Dye, 2010; Favril, 2021; Favril et al., 2020; Zhong et al., 2021). Due to the elevated rates of SDV in correctional settings and likely insufficient levels of staffing and resources to adequately address these issues (Abramsky & Fellner, 2003; Buche et al., 2018; Heffernan & Li, 2024), it is imperative to have access to a tool that can effectively and efficiently assess SDV risk for incarcerated individuals.

Associations of Age, Race, and Sex with Self-directed Violence in Prisons

The prevalence of SDV varies according to age, race/ethnicity, and sex, among many other things (CDC, 2023a). Research examining associations between age and SDV risk has been mixed. From 2000 to 2019, suicide rates were highest for those 55 years of age or older and lowest for those 18-34 years old in the U.S. state prison system (Carson, 2021b). These rates align with findings regarding the association between age and SDV, in which adults over 50 have the highest risk of SDV in prisons (Barry et al., 2017), while young adults (18-34 years) have the lowest risk (Zhong et al., 2021). Other evidence indicates that incarcerated young adults are more likely to engage in SDV than their older counterparts (Daniel & Fleming, 2006; Stoliker, 2018; Stoliker et al., 2020). Yet, there is also evidence of no significant association between age and SDV for this population (Marzano et al., 2016; Mumola, 2005), particularly when accounting for prison-level factors (Dye, 2010). Age-related variation in SDV risk and associated factors has primarily been attributed to some common life stressors related to getting older. These risk factors include the loss of loved ones, increased loneliness, chronic illness, cognitive decline, loss of self-sufficiency, and financial or material loss (Centers for Disease Control [CDC], 2022a; Conwell et al., 2011; National Council on Aging, 2024). These losses are likely further compounded by incarceration.

Prior evidence is mixed regarding associations between race and SDV. Some evidence

reports no association (Blaauw et al., 2005; Dye, 2010), while other evidence indicates that identifying as White is associated with a greater risk of SDV (Daniel & Fleming, 2006; Favril, 2021; Stoliker & Galli, 2021; Zhong et al., 2021). Evidence of race-related variation in SDV risk and associated factors has been attributed to cultural differences (i.e., intrapersonal perceptions or interpersonal factors) and the racial/ethnic makeup of the population within a correctional facility (Chu et al., 2017; Dye, 2010; Stoliker, 2018; Stoliker et al., 2021). For example, research shows that interpersonal factors like discrimination or social stress are most salient for Hispanic Americans, family stress for Asian and Black Americans, and intrapersonal perceptions (i.e., negative self-perception) for White and Asian Americans (Chu et al., 2017; Gomez et al., 2011). Additionally, some research determined that placement in a facility in which an individual shares a racial/ethnic identity with a greater proportion of the population may be protective against SDV while residing with a greater proportion of those with dissimilar racial backgrounds increases SDV risk (Dye, 2010; Stoliker, 2018; Stoliker et al., 2021).

The prevalence of specific forms of SDV (i.e., non-suicidal SDV, suicidal SDV, suicide attempt) also differ based on sex. Sex refers to the classification of living things as male or female according to their biological and physiological characteristics (e.g., male or female; Blakeman, 2020). Gender refers to socially constructed characteristics (i.e., norms, behaviors, roles) of men and women (Blakeman, 2020). Gender interacts with sex (World Health Organization, n.d.) and helps to provide context as to why there are sex-based differences in SDV. For example, the “gender paradox” refers to the phenomenon in which women are more likely to engage in non-fatal SDV (i.e., self-injurious behavior), while men are more likely to die by suicide (Schrijvers et al., 2012).

This gender paradox is prevalent among those who are incarcerated, as male sex is

strongly associated with suicide risk in prisons (Daniel & Fleming, 2005, 2005; Zhong et al., 2021), while female sex is strongly associated with attempted suicide and SDV in prisons (Favril, 2021; Favril et al., 2020). This gender paradox has been attributed to gender-based cultural differences, gender socialization, and evidence indicating that men are more likely to use more lethal methods when attempting suicide (Canetto & Sakinofsky, 1998; Freeman et al., 2017; Heidemann et al., 2016). For example, the culture in female prisons is one that typically values close, family-like relationships with peers and/or staff (i.e., pseudo-families), potentially due to women being socialized to fear separation and be responsive to what others need (Dye, 2011; Heidemann et al., 2016). In male facilities, social organization prioritizes safety, order, and preventing victimization while maintaining a "tough" façade rather than personal ties (Forsyth & Evans, 2003; Jiang & Winfree, 2006).

SDV Assessment in Correctional Settings

According to the National Commission on Correctional Health Care (NCCHC, 2019), the key to addressing SDV in correctional settings is to assess the factors driving the behaviors such as motive, purpose, and history. Additionally, suicidal behaviors require ongoing risk assessment to accurately identify those who are most at risk (NCCHC, 2019). An accurate assessment helps to determine how to appropriately direct and utilize strategies for intervention; however, at present, there is no definitive approach to these types of risk assessments due to the complexities of suicidal behaviors (NCCHC, 2019). The NCCHC (2019) suggests that risk assessments for SDV need to be an in-depth and ongoing process involving a comprehensive examination by a qualified mental health professional. However, the limited number of clinician-administered and evidence-based approaches available to assess and manage SDV and associated risks in correctional settings that do exist (e.g., Suicide Assessment Manual for Inmates [SAMI];

Chronological Assessment of Suicide Events [CASE]) have been poorly developed (Cramer et al., 2022; NCCHC, 2019). Therefore, there is a need for a corrections-specific SDV risk assessment process that is clinically comprehensive and structured (NCCHC, 2019).

The Self-Injury Risk Assessment Protocol for Corrections (SIRAP-C) was developed to address the need for a corrections-specific and accurate SDV risk assessment tool that meets the required legal mandates (Cramer et al., 2022). The SIRAP-C meets the NCCHC criteria in several ways. First, the SIRAP-C relies on the assessment of a mental health clinician. This eliminates many biases associated with self-report assessments (i.e., recall bias) and relies on personnel with the proper training to conduct these assessments rather than correctional officers. Second, the SIRAP-C captures relevant static and dynamic SDV risk and protective factors (Cramer et al., 2022). Third, this assessment is the only one of its kind that has been empirically evaluated for reliability and validity in correctional settings (Cramer et al., 2022). However, there is still a need to better understand how SDV risk assessment tools may differ based on sociodemographic characteristics, which has yet to be examined with the SIRAP-C.

The Current Study

Individuals incarcerated in prison are at high risk of suicidal and non-suicidal SDV, the latter of which is one of the leading causes of death in U.S. prisons (Carson, 2021a). As the U.S. correctional system faces significant correctional and mental health staffing shortages (Abramsky & Fellner, 2003; Buche et al., 2018; Heffernan & Li, 2024), there is a need for an effective and efficient SDV risk assessment tool for use in correctional environments. To be generalizable, this tool would need to be applicable to individuals with varying characteristics. This study will help to advance the knowledge regarding the SIRAP-C's applicability to various subgroups within correctional settings by testing demographic variation of the SIRAP-C

subscales. Therefore, the current study aims to assess demographic variation in SIRAP-C subscale scores based on (1) age, (2) race, and (3) sex.

Methods

Procedure

The current study utilizes secondary data provided by the NC DAC. This data was initially used for the development, evaluation, and refinement of the SIRAP-C, which is the result of a collaboration between NC DAC Department of Behavioral Health and academic investigators (Cramer et al., 2022). Rigorous steps were taken in the parent study to ensure participant confidentiality, and the current study personnel only had access to the de-identified data. The present study falls under a waiver of consent that was obtained from the university partner IRB board and approved by the correctional agency research committee in the parent SIRAP-C study.

The data primarily consisted of NC DAC medical records from the fourth quarter of 2016 through the first quarter of 2020 for incarcerated adults. The existing self-injury risk assessment documentation embedded into the NC DAC electronic health record was used to aid in the development of the SIRAP-C (Cramer et al., 2022). This assessment included the following: "(1) documentation of the SDV behavior event, (2) where necessary, a section to document the method of injury (e.g., cutting) and lethality assessment, (3) a mental status exam, (4) an assessment of 43 risk and protective factors with accompanying sections for narrative documentation, and (5) treatment recommendation" (Cramer et al., 2022, p. 4). Treatment recommendation consisted of either a recommendation for a new intervention or a continuation of current treatment (Cramer et al., 2022). SDV event assessment information and the corresponding demographic information for the incarcerated individual were merged for

analysis. Inclusion criteria for the parent study were as follows: individuals must have 1) been an adult housed in a North Carolina state correctional facility and 2) indicated some type of SDV event by a verbal statement or physical act, resulting in an assessment with a clinician (Cramer et al., 2022). For this study, anyone under 18 years of age was excluded because incarcerated persons under 18 years of age in this correctional system are treated separately from those 18 years of age and older.

Participants

Table 3.1 contains sample and demographic information. The total sample size was n = 3,915 individuals. Ages ranged from 18 to 92 years old (M = 34, SD = 10.77). Most of this sample is male (74.1%) and identified as Black (47.3%), followed by White (45.7%), Native American (3.4%), and Hispanic (3.1%), and Other racial minority (0.5%).

Measures

Demographic Characteristics

Sex is dichotomous and participants were identified as either "Male" or "Female." Responses for race in the original dataset were "White," "Black," "Native American," "Hispanic," "Asian," and "Other." Due to low cell counts, race was recoded into five categories by combining "Asian" and "Other" for a new category – "Other racial minority."

SIRAP-C Subscale Scores

The initial validation of the SIRAP-C resulted in the development of a seven-factor (27-item) structure comprised of the following risk and protective factors: depressive symptoms, reasons for living, history of SDV, current suicidal thinking, family history of SDV, coping skills and social connectedness. Responses for all subscales were coded as the presence of each item using "Yes" or "No." Specific information for each subscale is further described below.

Four subscales measure SDV risk factors. The depressive symptoms subscale includes five items (e.g., Feeling hopeless and helpless). Scores for this subscale ranged from 0-5. This subscale demonstrated good internal consistency (Exploratory Factor Analysis [EFA] α = .75; Confirmatory Factor Analysis [CFA] α=.73; Cramer et al., 2022). The history of SDV subscale includes five items (e.g., History of aborted suicide attempt). Scores for this subscale ranged from 0-5. This subscale demonstrated good internal consistency (EFA α = .79; CFA α = .78; Cramer et al., 2022). The current suicidal thinking subscale consists of four items (e.g., Current suicidal ideation). Scores for this subscale ranged from 0-4. This subscale demonstrated excellent internal consistency (EFA α = .90; CFA α = .90; Cramer et al., 2022). The family history of SDV subscale includes three items (e.g., Family history of psychiatric treatment). Scores for this subscale ranged from 0-3. This subscale demonstrated good internal consistency (EFA α = .74; CFA α = .70; Cramer et al., 2022).

Three subscales measure SDV protective factors. The reasons for living subscale includes three items (e.g., Ability to identify reasons to live). Scores for this subscale ranged from 0-3. This subscale demonstrated good internal consistency (EFA α = .74; CFA α =.74; Cramer et al., 2022). The coping skills subscale includes two items (e.g., Able to cope with stress). Scores for this subscale ranged from 0-2. This subscale demonstrated acceptable internal consistency (EFA α = .80; CFA α = .79; Cramer et al., 2022). The social connectedness subscale includes three items (e.g., Lack of family connections); one item is reverse scored, and scores for this subscale ranged from 0-3. This subscale demonstrated marginal internal consistency (EFA α = .71; CFA α = .69; Cramer et al., 2022).

Analyses

Data were analyzed using IBM SPSS Statistics (Version 28). Missing values for the risk and protective factors used in subscale development were supplanted using multiple imputation in the parent SDV event assessment study (Cramer et al., 2022). Descriptive statistics are provided for all variables of interest. To address the first aim of examining age-based variation, bivariate correlations using Pearson *r* coefficients were computed to examine the direction and magnitude of the association between age and each SIRAP-C subscale score. For aim two, ANOVA tests were conducted to determine between-group differences in average subscale scores based on race. Subscales that violated the heterogeneity of variance assumption were examined via Welch's ANOVA and the Games-Howell post-hoc test, which are robust to violations of this assumption and demonstrate adequate control for Type I error (Liu, 2015; Tomarken & Serlin, 1986). Remaining subscales were examined using ANOVA with Bonferroni correction due to multiple comparisons (Armstrong, 2014). For aim three, demographic variation in subscales based on sex was assessed via independent samples t-tests. Equality of variances was assessed via Levene's test and appropriate test statistics were reported. Effect sizes are reported for all associations for ANOVA and t-test analyses. Effect size metrics are guided by Cohen's recommendations (Cohen, 1988, 1992).

Results

Demographic information is presented in Table 3.1. Participants received low to moderate scores on all SIRAP-C subscales. Based on the possible range of values for each subscale (i.e., 0-2, 0-3, 0-4, 0-5), the overall average scores for depressive symptoms (M = 1.41, SD = 1.55), current suicidal thinking (M = .81, SD = 1.39) and family history of SDV subscales (M = .72 SD = 1.02) were low. Additionally, the average scores for reasons for living (M = 2.54, SD = 1.75),

history of SDV (M = 2.54, SD = 1.75), coping skills (M = 1.07, SD = .91), and social connectedness (M = 2.34, SD = .98) are moderate.

Aim 1: Variation in Subscale Scores by Age

Age shared significant relationships with all SIRAP-C subscales apart from the family history of SDV and coping skills subscales (see Table 3.2). Significantly weak and positive relationships were observed for age with depressive symptoms, history of SDV, and current suicidal thinking. Additionally, significantly weak, and negative relationships were observed for age with reasons for living and the social connectedness subscales. All observed significant findings are near null, and likely statistical artifacts of a large sample size.

Aim 2: Variation in Subscale Scores by Race

Results of the one-way ANOVAs indicated that some subscale scores significantly differed between racial groups. The assumption of homogeneity of variances was violated for the depressive symptoms, reasons for living, current suicidal thinking, and family history of suicide subscales. The SIRAP-C subscales displayed significant small to large differences between racial groups (see Table 3.3). Significant differences were found in the following subscales: depressive symptoms, history of SDV, and family history of SDV.

The Other racial minority group had the highest depressive symptoms scores, followed by White individuals. The following significant patterns emerged for depressive symptom scores: White individuals scored higher than Black individuals (small effect), and those included in the Other racial minority group scored higher than both Black (large effect) and Native American individuals (large effect; Cohen 1988, 1992). For history of SDV, White individuals had the highest average score, and the following significant patterns emerged: White individuals scored higher than both Black (small effect) and Hispanic individuals (approaching moderate effect

size). White individuals also had the highest average scores for family history of SDV. Significant patterns emerged for the family history of SDV subscale for the following comparisons: White individuals scored higher than both Black (small effect) and Native American individuals (small effect).

Aim 3: Variation in Subscale Scores by Sex

Table 3.4 contains the results of the independent samples t-tests. The assumption of homogeneity of variances was violated for all subscales apart from depressive symptoms. Men received higher current suicidal thinking subscale scores compared to women. On the other hand, women received higher subscale scores than men on all other subscales. Small effects were observed between groups for all subscales (Cohen, 1988, 1992), with history of SDV being the only clinically meaningful variation. All other significant effects are likely statistical artifacts due to large study sample size.

Discussion

There is evidence of demographic-based distinctions regarding SDV and related risk and protective factors, specifically in correctional environments (Favril et al., 2020; Stoliker & Galli, 2021; White et al., 2002; Zhong et al., 2021). Correctional systems need an effective and efficient SDV risk assessment tool that is applicable to individuals of various characteristics. This study sought to investigate demographic variation in subscale scores for the SIRAP-C. Overall, significant differences in SIRAP-C subscale scores based on age, race, and sex were observed; however, most findings were likely due to the large sample size.

The first aim was to examine variation in SIRAP-C subscale scores based on age. Findings from this study indicate that there were no clinically meaningful associations between age and SIRAP-C subscale scores. Though significant, all relationships were weak in magnitude,

indicating they are likely due to the large sample size and have no practical significance (Sullivan & Feinn, 2012). It has been suggested that once institutional factors (i.e., housing type, security level) are accounted for, person-level factors are no longer significant (Dye, 2010). These findings may reflect this phenomenon; however, institutional factors were not accounted for in this analysis.

The second aim was to examine variation in SIRAP-C subscale scores based on race. Meaningful race-based variations were observed for depressive symptoms and history of SDV. The Other racial minority group (Asian and Other) scored at least two times higher for depressive symptoms than those who were Black and Native American. These findings are inconsistent with reports of a lower prevalence of depression among Asian Americans (4.8%) and Pacific Islanders (5.1%; National Institute of Mental Health [NIMH], 2023a). However, it is noted that it is difficult to draw conclusions from these findings as this group represented less than 1% of the sample. Still, research has shown that there are culturally-based differences in how depression is experienced and expressed. For example, depression for Asian American/Pacific Islanders has been tied to culture, where one's self-identity is typically tied to the achievements and/or failures of one's family (Kim et al., 1999, 2001). Failure, as well as engagement in inappropriate social behaviors, is considered shameful for the family, and help-seeking behaviors (i.e., seeking mental health care) tend to be stigmatized (Lau & Takeuchi, 2001; Maeshima & Parent, 2022; Shea & Yeh, 2008; Zane & Yeh, 2002). It is possible that incarceration for an Asian American individual reinforces a negative self-perception or shames their family. They may also be less likely to seek help or discuss their mental health while the negative perceptions are being enforced. Overall, depression may be the manifestation of different underlying mechanisms directly influenced by one's racial or ethnic identity.

Meaningful variation was also observed between White and Hispanic individuals for history of SDV scores, with White individuals scoring higher and the observed effect approaching moderate size (but still small). This aligns with evidence showing that White individuals are more likely to receive mental health treatment (Substance Abuse and Mental Health Services Administration, 2015; Terlizzi & Schiller, 2022), report higher prevalence of mental illness (NIMH, 2023b), and report a history of suicide over their lifetimes (Stoliker & Galli, 2021) compared to Hispanic individuals. However, the observed differences in average scores for each group suggest that the differences in scores between White and Hispanic individuals are negligible.

The third aim was to examine sex-based variation in SIRAP-C subscale scores. Significant differences on each SIRAP-C subscale were observed, with women scoring higher than men on all but the current suicidal thinking subscale, though the observed effects were small. This indicates findings were likely the result of a large sample size (Sullivan & Feinn, 2012). There may be some meaningful variation in the history of SDV subscale scores, as the observed effect size falls between small and medium parameters (Cohen, 1998, 1992). This finding appears to be consistent with prior research as, historically, women have been found to be more likely to receive mental health treatment, receive a certain mental health diagnosis (i.e., depression; American Psychiatric Association, 2017; Terlizzi & Schiller, 2022), and engage in less lethal methods of SDV (Schrijvers et al., 2012). Otherwise, there appear to be negligible differences in these risk factor subscale scores for incarcerated men and women.

Implications and Future Directions

These findings suggest that it may be important for mental health professionals to consider one's race and/or ethnic cultural identity when addressing depressive symptoms. The

development, interpretation, expression, and treatment of depressive symptoms are informed by one's cultural identity or background (Chang et al., 2016; Kennedy et al., 2018). Awareness of certain cultural aspects of an individual's background and identity could aid in the identification, assessment, and subsequent treatment of depressive symptoms. Utilizing cultural humility, which involves using self-reflexivity to inform one's "understanding and respect of cultural differences" (CDC, 2024, p. 1), to address depressive symptoms may aid in mitigating these symptoms and protect against SDV risk. For example, practicing cultural humility may strengthen therapeutic relationships by improving cultural understanding, promoting collaborative therapeutic processes and patient-centered approaches, and addressing cultural biases that may influence diagnoses and treatment planning, potentially improving therapeutic outcomes (Mosher et al., 2017).

These findings also demonstrate that the SIRAP-C assessment tool is applicable across the groups studied. Future research should consider exploring how sociodemographic characteristics may moderate the relationships between SDV and related factors, as well as how these characteristics interact with each other to better inform assessments. Research has established that the burden of SDV and associated factors typically falls on certain groups (i.e., American Indian/Alaska Native and non-Hispanic White people have the highest rate of suicide; women disproportionately burdened by depression; CDC, 2023a; Hasin et al., 2018; Kessler et al., 2005); however, there is limited understanding of how multiple group membership, or intersectionality, may affect these associations (Standley, 2022).

Limitations

This study has several limitations. First, this study cannot make inferences regarding SDV behaviors, only the associated risk and protective factors and how demographic characteristics may influence those factors. Future research could address this by examining

associations between risk factors and SDV for various demographic groups. Second, the sample used for this study is not generalizable as it was derived from one state prison system. Third, this data is cross-sectional. Thus, it is not possible to track trends regarding SDV risk and protective factors among this sample suggesting a need for longitudinal data and the inclusion of more prison systems to investigate trends over time and generalize findings. Finally, there were low counts across racial groups that were not White or Black, likely reducing the precision of results for those groups, indicating a need for more detailed reporting regarding race and ethnic identity.

Conclusion

The SIRAP-C appears to be applicable across various demographic groups, as most findings demonstrated negligible differences between groups for age, race, and sex. Meaningful race-based variations emerged for depressive symptom scores, and race and sex-based variations emerged for history of SDV subscale scores. Future research and practice should account for the intersectionality of identity, culturally relevant factors, and the ways in which demographic characteristics may modify associations between SDV risk and associated factors.

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Table 3.1

Descriptive Characteristics of Study Variables

Variable	n (%)	M(SD)	Range
Sex			
Male	2899 (74.1%)	–	
Female	1015 (25.9%)	–	
Race			
White	1797 (45.8%)	–	
Black	1859 (47.2%)	–	
Hispanic	122 (3.1%)	–	
Native American	131 (3.3%)	–	
Other Racial Minority	18 (0.5%)		
Age		34.67 (10.77)	18-92
Depressive Symptoms Subscale		1.41 (1.55)	0-5
Reasons for Living Subscale		2.38 (.96)	0-3
History of SDV Subscale		2.54 (1.75)	0-5
Current Suicide Subscale		0.81 (1.39)	0-4
Family History of SDV Subscale		0.72 (1.02)	0-3
Coping Skills Subscale		1.07 (0.91)	0-2
Social Connectedness Subscale		2.34 (0.98)	0-3

Table 3.2

Bivariate Correlations for Age with SIRAP-C Subscales

Variable	1	2	3	4	5	6	7
1. Age	–						
2. Depressive Symptoms	.100***	–					
3. Reasons for Living	-.062***	-.442***	–				
4. History of SDV	.050***	.303***	-.225***	–			
5. Current Suicidal Thinking	.044***	.437***	-.617***	.209***	–		
6. Family History SDV	.019	.297***	-.185***	.401***	.179***	–	
7. Coping Skills	-.019	-.358***	.415***	-.264***	-.413***	-.184***	–
8. Social Connectedness	-.108***	-.266***	.426***	-.183***	-.288***	-.140***	.302***

Note. ***$p < .001$

Table 3.3

Results of One-way ANOVA for Race and SIRAP-C Subscale Scores

SIRAP-C Subscale	Statistic, df	*p*	White (n = 1794)	Black (n = 1849)	Hispanic (n = 122)	Native American (n=131)	Other Racial Minority (n=18)	Cohen's *d*
Depressive Symptoms[2]	9.67 (4, 108.86)	<.001	1.55 (1.60)[a]	1.27 (1.49)[a,b]	1.39 (1.46)	1.25 (1.41)[c]	2.56 (1.65)[b,c]	[a]0.18, [b]-0.82, [c] -0.85
Reasons for Living[2]	2.52 (4, 108.45)	.045	2.40 (0.94)	2.36 (0.98)	2.39 (0.97)	2.46 (0.89)	1.44 (1.42)	--
History of SDV[1]	9.95 (4,3909)	<.001	2.72 (1.71)[a,b]	2.41 (1.77)[a]	2.57 (1.82)[b]	2.04 (1.72)	2.50 (1.92)	[a]0.18, [b]0.39
Current Suicidal Thinking[2]	2.28 (4, 108.49)	.065	0.77 (1.38)	0.82 (1.40)	0.72 (1.29)	0.91 (1.44)	1.94 (1.86)	--
Family Suicide History[2]	10.37 (4, 109.07)	<.001	0.83 (1.07)[a,b]	0.62 (0.97)[a]	0.75 (1.10)	0.55 (0.87)[b]	0.61 (0.92)	[a]0.21, [b]0.29
Coping Skills[1]	.972 (4,3909)	.422	1.07 (0.91)	1.07 (0.91)	0.98 (.94)	1.18 (0.89)	0.89 (0.96)	--
Social Connectedness[1]	.228 (4,3909)	.923	2.33 (0.99)	2.33 (0.99)	2.40 (0.89)	2.38 (0.96)	2.33 (1.03)	--

Note. [1] = f-statistic; [2] = Wald statistic; [a,b,c] = Matching superscripts denote columns with statistically significant differences (post-hoc comparison $p < .05$).

Table 3.4

Results of Independent Sample T-test for Gender and SIRAP-C Subscale Scores

	Male		Female					
SIRAP-C Subscale	**M**	***SD***	**M**	***SD***	**t(df)**	**p-value**	**Cohen's d**	**Mean Difference**
Depressive Symptoms[1]	1.35	1.55	1.57	1.53	-3.80(3912)*	<.001	-0.14	-0.21
Reasons for Living[2]	2.35	1.00	2.48	0.84	-4.02(2075.96)*	<.001	-0.14	-0.13
History of SDV[2]	2.40	1.79	2.94	1.57	-8.99(2007.20)*	<.001	-0.31	-0.53
Current Suicidal Thinking[2]	0.86	1.43	0.65	1.28	4.30(1956.63)*	<.001	0.15	0.21
Family History of SDV[2]	0.67	0.99	0.86	1.09	-4.80(1645.64)*	<.001	-0.18	-0.19
Coping Skills[2]	1.02	0.91	1.21	0.88	-5.96(1835.40)*	<.001	-0.21	-0.19
Social Connectedness[2]	2.27	1.03	2.51	0.82	-7.35(2200.57)*	<.001	-0.24	-0.24

Note. [1] = t-test; [2] = Wald t-test; *$p < .001$

CHAPTER 4: A MULTILEVEL EXAMINATION OF SOCIAL CONNECTION, DEPRESSIVE SYMPTOMS, AND SELF-DIRECTED VIOLENCE AMONG A U.S. PRISON SAMPLE

Abstract

Depression and self-directed violence (SDV) are prevalent health concerns in the United States prison system. Social connection, a multilevel construct, acts as a critical risk and protective factor for these outcomes, yet multilevel investigations of these associations are limited. Informed by the social-ecological model, this study employs hierarchical modeling to investigate the relationships between multilevel social connection with depressive symptoms and SDV among adults incarcerated in a U.S. state prison system. The final hierarchical linear model indicated that social connection across the SEM shared statistically significant relationships with depressive symptoms; However, effect sizes for relationship-, community-, and institutional-level social connection were minimal. Social isolation at the individual-level was meaningfully associated with higher depressive symptom scores. Only institutional-level restrictive housing placements were associated with a greater likelihood of both non-suicidal (5.4%) and suicidal (2.9%) SDV events in the final hierarchical multinomial probit model. These findings suggest that individual- and institutional-level social connection are salient risk factors for depressive symptoms and SDV events. Future research is needed to explore social connection as a multilevel construct and to gain a better understanding of how various levels of social connection interact and influence each other, as well as adverse mental and physical health outcomes within the context of the prison. Social connectedness in prison settings can likely be improved by mitigating the use of restrictive housing practices, increasing the frequency of routine mental health screenings, promoting social connection through current modes of social interaction, and implementing additional socially-based interventions and programming.

Introduction

Incarcerated people in the United States are at a disproportionately higher risk of depression and self-directed violence (SDV), defined as "behavior that is self-directed and deliberately results in injury or the potential for injury to oneself" (Crosby et al., 2011, p. 21). SDV may be suicidal (lethal intent) or non-suicidal (no lethal intent; Crosby et al., 2011). Social connection is a strong risk factor for these outcomes and has been identified as a critical factor in SDV prevention (Favril, 2021; Favril et al., 2020, 2022; Marzano et al., 2016; Stone et al., 2017). Social connection is a multidimensional phenomenon that can be understood within the context of the social-ecological model (SEM), which considers how factors at the individual-, relationship-, community-, and societal-levels may overlap and interact (Sallis et al., 2008). Research has yet to comprehensively examine the influence of social connection, across multiple levels, on depression and SDV for those incarcerated in U.S. prisons (Favril et al., 2020; Folk et al., 2019; Zhong et al., 2021).

This study aims to contribute to filling this gap by examining the association between social connection across all levels of the SEM and SDV and depression for those incarcerated in a state prison system. First, the prevalence of depression and SDV in U.S. prisons and the importance of social connections for incarcerated individuals are discussed. Next, a SEM for social connection within the context of incarceration is presented using indicators for social connection used to develop the Self-injury Risk Assessment Protocol for Corrections (SIRAP-C). Finally, the relationship between social connection across the SEM with depressive symptoms and SDV among a sample of adults incarcerated in a state prison system is examined using hierarchical regression analyses.

Prevalence of Depression and Self-directed Violence in Correctional Settings

Suicidal and non-suicidal SDV are prevalent in correction settings. The estimated prevalence of non-suicidal SDV in U.S. state prisons is about 2% (Appelbaum et al., 2011; Smith & Kaminski, 2011); however, this is likely an underestimation. Nationally, some facilities report that more than 30% of those incarcerated engage in non-suicidal SDV (Smith & Kaminski, 2011). Suicide, defined as death caused by self-injury with intent to die (Crosby et al., 2011), is the leading cause of unnatural deaths in state and federal prisons (Carson, 2021a). Suicide occurs at a higher rate in the state prison system compared to the general population (25 vs 22 per 100,000; Carson, 2021a), accounting for 8% of all state prison deaths in 2019 (Carson, 2021b).

Depression, a mood disorder that negatively affects how one feels, thinks, and acts (National Institute of Mental Health, 2023), is commonly associated with suicidal thinking and behaviors (Bertolote & Fleischmann, 2002). The reported prevalence of depressive symptoms in all U.S. state prisons (i.e., persistent sad, numb, or empty mood) ranged from 32.9% to 35% (D. J. James & Glaze, 2006), and, in 2016, about 14% of individuals in state prisons met the threshold for serious psychological distress in the past 30 days, which includes symptoms of depression such as depressed mood (Maruschak & Bronson, 2021).

The Importance of Social Connection for Incarcerated Individuals

Globally, social connectedness has been identified as a critical strategy for suicide prevention (Stone et al., 2017). Social connectedness is “the degree to which people have and perceive a desired number, quality, and diversity of relationships that create a sense of belonging, and being cared for, valued and supported” (Centers for Disease Control and Prevention [CDC], 2013, p. 3). It has been theorized that people possess a fundamental need to belong and connect with others, and failure to meet this need may contribute to adverse outcomes (Baumeister &

Leary, 1995). The absence of social connection is associated with mental health conditions such as depression and anxiety (Mann et al., 2022) and a greater risk of self-harm and suicide (Mann et al., 2022; McClelland et al., 2020). Simultaneously, social connection has been linked to the mitigation of specific mental health conditions like depression (Martino et al., 2015) and lower risk of violent and suicide-related behaviors (Stone et al., 2017).

Prisons are physically and socially isolating, separating incarcerated individuals from their loved ones and communities. This isolation is compounded by restrictive policies that reduce the frequency and quality of social contact (e.g., solitary confinement or limited or highly regulated visitation) and further segregate individuals from their incarcerated peers (L. Wang, 2021). Prison segregation is associated with greater psychological distress, increased psychiatric morbidity, and elevated symptoms of depression and anxiety (Brown, 2020). The absence of social support (Rivlin et al., 2013) and social capital (Archuleta et al., 2020) are linked to higher levels of depression, the absence of family support (Dye & Aday, 2013), and placement in restrictive settings, solitary confinement, and single-cell housing (Favril, 2021; Favril et al., 2020, 2022; Zhong et al., 2021) has been linked to greater suicide ideation and SDV risk. Alternatively, more parental involvement (Tadros et al., 2022) and in-prison support (Levitt & Loper, 2009) are linked to fewer depressive symptoms, and more perceived social and family support appears to reduce suicidal ideation risk (Dye & Aday, 2013; Richie et al., 2021).

A Social-Ecological Model for Social Connection within Correctional Settings

Grounded in the CDC's social-ecological model of health (CDC, 2022) and Cramer and Kapusta's (2017) Social-Ecological Suicide Prevention Model, a Social-Ecological Model for Social Connection in Correctional Settings (Figure 1) is presented here. This model provides a comprehensive perspective of the influence of social connection operating at multiple levels

within the context of a prison environment. The indicators of social connection presented here are based on items considered for use in the development of the SIRAP-C, a SDV risk assessment tool developed to meet the need for an evidence-based approach to SDV in correctional settings that meets legal standards (Cramer et al., 2022). This four-level model was developed by placing the social connectedness indicators at the appropriate SEM level (individual, relationship, community, and institutional), which was then used to guide analyses.

The individual-level includes social isolation, lack of family connections, and responsibility to loved ones (McClelland et al., 2020; Motillon-Toudic et al., 2022; J. Wang et al., 2018). These concepts are inherent to the experience of incarceration (i.e., decrease in presence and frequency of social contact), were established pre-incarceration, or primarily concern a perception or feeling related to relationships with others (e.g., sense of responsibility). The relationship-level consists of supportive family relationships and social support in the institution (Rivlin et al., 2013; J. Wang et al., 2018). This level involves practical, tangible, and emotional support that is directly and actively provided (American Psychological Association, n.d.). This may include contact via phone, mail, and visits, the provision of resources (i.e., commissary) from friends and family, and social support provided by other incarcerated individuals, correctional staff, or service and program providers.

The community-level consists of one indicator – receipt of mental health treatment (Favril et al., 2022; Janofsky, 2009). Healthcare providers may serve as part of a formal social support network (Tomai & Lauriola, 2022), providing services and care to address health-related needs. The institutional-level also consists of one indicator – housing type. Housing types dictate the security and restrictions imposed on an incarcerated person, directly affecting their ability to move through the facility, participate in programs or services, and engage or interact with others.

More restriction (e.g., solitary confinement and maximum security) negatively impacts mental health and SDV risk for carceral populations (Brown, 2020; Luigi et al., 2020).

The Current Study

Social connection has been identified as a significant risk and protective factor for SDV and depression (Favril et al., 2022, 2022; Marzano et al., 2016; Rao et al., 2018) and is one of the few modifiable factors associated with these outcomes. To our knowledge, research has yet to sufficiently examine how social connection, conceptualized across multiple levels of the SEM, impacts SDV and depressive symptoms among incarcerated populations. The current study examines the relationship between multilevel social connectedness with SDV and depressive symptoms for a state prison sample. The hypotheses are as follows:

1. Higher degrees of social connectedness across the SEM will be significantly associated with lower depressive symptom scores and lower degrees of social connection with higher depressive symptom scores.
2. Higher degrees of social connectedness across the SEM will be significantly associated with a lower likelihood of non-suicidal SDV and lower degrees of social connectivity with a greater likelihood of non-suicidal SDV.
3. Higher degrees of social connectedness across the SEM will be significantly associated with a lower likelihood of attempted suicidal SDV, and lower degrees of social connection will be associated with a greater likelihood of attempted suicidal SDV.

Methods

Procedures

This study utilized secondary de-identified data provided by the North Carolina Department of Adult Corrections (NC DAC) which consisted of medical records and information

from the NC DAC's existing self-injury risk assessment protocol from the fourth quarter of 2016 to the first quarter of 2020 for incarcerated adults (Cramer et al., 2022). The self-injury risk assessment protocol was utilized when an incarcerated person communicated or behaved in ways indicative of possible SDV risk (Cramer et al., 2022). This process consisted of the following: 1) documentation of the SDV event, 2) documentation of the method of injury and a lethality assessment, 3) a mental status exam, 4) an assessment and narrative documentation of 43 risk and protective factors, 5) and a treatment recommendation (e.g., outpatient therapy, outpatient therapy and elevated precautions, residential treatment, inpatient psychiatric hospitalizations, or no treatment; Cramer et al., 2022). Risk and protective factors included in the existing NC DAC self-injury risk assessment procedure were derived from the Suicide Assessment Five-step Evaluation and Triage (SAFE-T) model, which identifies static (i.e., fixed) and dynamic (i.e., may change) risk factors and protective factors for SDV (Cramer et al., 2022; Jacobs, 2007).

In the parent study, an SDV risk assessment tool called The Self Injury Risk Assessment Protocol for Corrections (SIRAP-C) was developed for use in correctional settings (Cramer et al., 2022). The SIRAP-C was based on three sections (1, 4, and 5) of the existing NC DAC self-injury risk assessment protocol and the SAFE-T risk and protective factors, which were augmented with reviews of corrections-specific risk and protective factors. The finalized list of dynamic and static risk and protective factors for SDV were used to refine subscales in developing the SIRAP-C (Cramer et al., 2022). To be included in the original dataset, incarcerated persons must have been adults housed in an NC state correctional facility and must have indicated some type of SDV via verbal statement or physical act, which resulted in a clinical self-injury risk assessment (Cramer et al., 2022). For this study, participants under the age of 18 were excluded, as they are treated separately within this prison system.

Measures

Demographic Characteristics

Demographic information was recorded for the age, sex, and race of participants. Ages ranged from 18 to 92, and participants were identified as either male or female. Responses for race included White, Black, Hispanic, Native American, Asian, and Other racial minority[1]. For this study, race was recoded into four categories: White, Black, Hispanic, and Other racial minority (including Asian and other). To avoid complete or quasi-complete separation issues (when an outcome separates a predictor or combination of predictors completely; Hosmer, 2013), race was recoded again into three categories (White, Black, and Other racial minority) for the hierarchical multinomial probit model.

Social Connection Indicators

Independent variables represent aspects of social connection that fit within the four-level SEM. All social connection measures, apart from the community- and institutional-level variable, refer to whether they were present at the time of the SDV event (e.g., 1 = "Yes" or 0 = "No"). Individual-level social connection variables include the presence of social isolation, (lack of) family connections, and responsibility to loved ones. Relationship-level variables include supportive family relationships and social support within the institution. Community and institutional social connection variables include support services and housing type. Support services are based on the treatment recommendations incarcerated individuals received prior to the current self-injury risk assessment. This prior treatment recommendation was recoded to represent receipt of support services resulting in three categories: a) no treatment, b) outpatient

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[1] Language used for racial and ethnic categories is based on the provided NC DAC demographic information

treatment (therapy and/or psychiatry), and c) inpatient psychiatric treatment. The reference category was no treatment.

Housing type was recorded based on where an individual was when an SDV event occurred. Housing type was used to measure restrictiveness at the time of the SDV event. This variable was originally divided into eight categories and recoded for analysis based on NC DAC recommendations regarding the restrictiveness of each type of housing. The resulting variable consisted of six categories: 1) regular population, 2) residential, 3) Therapeutic Diversion Units (TDU) and inpatient units, 4) Rehabilitative Diversion Unit (RDU), 5) restrictive, and 6) non-housing areas. Regular population (e.g., dorm housing) is the least restrictive and used as the reference category. Single-cell housing is like dorm housing in terms of restrictiveness; however, due to evidence of significant associations between single-cell housing placements and SDV risk (Favril et al., 2020; Zhong et al., 2021), it was included as a separate category.

Depressive Symptoms and SDV Events

The depressive symptoms measure is based on the SIRAP-C's depressive symptoms subscale, which includes five items: 1) feeling hopeless and helpless, 2) feeling a burden to others, 3) inability to feel pleasure, 4) sleep problems, and 5) uncontrolled mental health symptoms (Cramer et al., 2022). Responses were recorded as to the presence of each item (e.g., 1 = "Yes" or 0 = "No"). The SDV event outcome measure is based on the existing SDV risk assessment procedure integrated into the NC DAC electronic health record (Cramer et al., 2022). SDV events were categorized as no occurrence of SDV, non-suicidal SDV, or attempted suicidal SDV. The category labeled "no occurrence of SDV" included events without any self-injurious action (i.e., communicating suicidal ideation or desire). The non-suicidal and suicidal SDV categories comprised events with a self-injurious action but differed based on whether the

actions were motivated by suicidal or non-suicidal intent. The reference category was no occurrence of SDV.

Covariates

Bivariate analyses were used to identify potential covariates for each hierarchical model. Covariates were considered for inclusion in the full models if they were associated with the outcomes of interest at $p < 0.25$, as traditional significance levels ($p = .05$) may fail to identify key variables (Bursac et al., 2008; Hosmer, 2013). Covariates significantly associated with depressive symptoms included history of child abuse, history of mental illness, history of inpatient psychiatric treatment, history of suicidal and non-suicidal SDV, family history of psychiatric treatment, a recent significant loss, ability to cope with stress, chronic medical condition, current suicidal ideation, suicidal intention or suicidal plan, sentence length and violent/non-violent disciplinary infractions. Covariates significantly associated with SDV event outcomes included the following SIRAP-C subscales: reasons for living, history of SDV, current suicidal thinking, family history of SDV, coping skills, and disciplinary and violent disciplinary infractions. Demographic indicators (age, sex, and race) were included in all models.

Analytic Plan

STATA 18 was used for all analyses (StataCorp, 2023). In the parent study, multiple imputation was used to supplant missing values for risk and protective factors (Cramer et al., 2022). In the current study, missingness ranged from 0.03% to 1.4%. Cases missing basic demographic, SDV event, or social connection variable information were excluded for complete case analysis. The final sample size for both models was $N = 3,856$. VIF statistics were examined to determine if there was multicollinearity between independent variables using a threshold of less than four (O'Brien, 2007). No multicollinearity problems were identified.

To address hypothesis one, a hierarchical linear regression model was performed to predict the relationship between social connection and depressive symptoms . A backward elimination approach was employed for covariate selection (Bursac et al., 2008). Social connection indicators were not eligible for exclusion and were added based on theoretical assumptions. Traditional significance levels (p = .05) were used for model building; thus, covariates were singularly eliminated if they did not reach statistical significance, did not contribute to a significant change in R^2 (F-test p-value threshold of p <.05), or did not contribute more predictive power then the social connection variables. Covariate selection models were compared using the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) to determine which model indicated a better fit (Kuha, 2004). Social connection variables were entered based on their placement in the SEM. The final model consisted of demographic variables and covariates (step one), individual-level social connection variables (step two), relationship variables (step three), community variables (step four), and institutional variables (step five). Effect size metrics are based on Field's (2013) recommendations.

To address hypothesis two, a hierarchical multinomial probit regression model (Razzaghi, 2013) was performed to predict the relationship between social connection and SDV events. A forward selection and backward exclusion stepwise approach (Hosmer, 2013) was utilized for covariate selection, and covariate models were compared using AIC and BIC. The final model consisted of demographic variables and covariates (step one), individual-level social connection variables (step two), relationship variables (step three), community variables (step four), and institutional variables (step five). Marginal effects and standard errors are reported for all models and 95% confidence intervals for the final model.

Results

Participant Characteristics

Demographic information is presented in Table 4.1. Almost 37% of participants were socially isolated, nearly 27% lacked family connections, and about 80% had supportive family relationships or a responsibility to loved ones. Approximately 60% received social support in the institution, 48% received outpatient treatment, and 17% received inpatient treatment. Most were placed in restrictive or RDU housing (about 54%), followed by dorm or general population housing (24%), single-cell housing (11%), and then inpatient or TDU housing (6%). Average depressive symptom scores were low (M = 1.41, SD = 1.55), and 24% of individuals who had an SDV-related event had at least one event that was non-suicidal. Less than 6% of individuals had at least one attempted suicidal SDV event.

Hypothesis 1: Social Connection and Depressive Symptoms

Hypothesis one was partially supported. The final hierarchical linear regression model (Table 4.2) explained 43% of the variation in depressive symptoms scores. Demographic characteristics and covariates accounted for 35% of the variance, and individual-level social connection variables accounted for 7%. Relationship- and community-level indicators did not account for any additional variance, while the institutional-level indicator accounted for an additional 1%. When controlling for other predictors, social isolation, supportive family relationships, social support in the institution, inpatient psychiatric treatment, restrictive or RDU housing, and non-housing areas were significant in the final model. Social isolation (moderate effect) and receiving inpatient psychiatric treatment (very small effect) were associated with higher depressive symptom scores. Supportive family relationships, social support in the

institution, and restrictive or RDU housing and non-housing areas (very small effects) were associated with lower depressive symptom scores.

Hypothesis 2: Social Connection and SDV

Hypothesis two was partially supported. In the hierarchical multinomial probit regression model (Table 4.3), sex, disciplinary infractions, and history of SDV were associated with a greater probability of non-suicidal SDV compared to no occurrence of SDV. In contrast, age, Black race, depressive symptoms, current suicidal thinking, and coping skills were associated with a lower probability of non-suicidal SDV. Depressive symptoms and current suicidal thinking were associated with a greater probability of suicidal SDV. In contrast, age, Other racial minority, disciplinary infractions, and reasons for living were associated with a lower probability of suicidal SDV compared to no occurrence of SDV. When controlling for other predictors, institutional-level social connection reached statistical significance in the full model. The probability of non-suicidal SDV increased by 5.4%, 95% CI [0.017, 0.091] and attempted suicidal SDV by 2.9%, 95% CI [0.011, 0.048] when individuals were placed in restrictive or RDU housing compared to no occurrence of SDV.

Discussion

Adults incarcerated in the U.S. experience high rates of depressive symptoms and SDV (Carson, 2021a; Favril, 2021; Prins, 2014). Social connection is a multilevel phenomenon identified as a significant risk and protective factor for these outcomes. However, there are limited multilevel investigations of associations between social connection with SDV and depression. This study investigated the relationship between social connection across the SEM with depressive symptoms and SDV occurrence for adults incarcerated in a U.S. state prison

system. Overall, partial support was found for each hypothesis, as higher or lower degrees of social connection at least one level of the SEM was meaningfully associated with each outcome.

To address hypothesis one, the relationship between social connection across the SEM and depressive symptoms was examined. Some form of social connection at each level of the SEM was associated with higher or lower depressive symptom scores. However, most effect sizes were very small and potentially an artifact of the sample size. Social isolation was meaningfully associated with higher depressive symptom scores, which is consistent with evidence from both general and carceral populations (Hawkley & Capitanio, 2015; Strong et al., 2020), as isolation may cause feelings of loneliness and increase the risk of adverse physical and mental health conditions (CDC, 2021; Hawkley & Capitanio, 2015). Family relationships and peer support were not meaningfully associated with lower depressive symptom scores but reached statistical significance. This is somewhat consistent with research reporting a significant protective effect of interpersonal relationships on depression (Archuleta et al., 2020; Tadros et al., 2022). Overall, these results partially align with SEM assumptions in which individual-level factors should have the most direct influence on an outcome (Kilanowski, 2017). These findings may also imply that for depression, predictors at the external levels (e.g., community or institutional) have a "weaker" effect on outcomes that may occur on inner levels (e.g., individual or relationship). SEM assumptions also dictate that factors interact and influence each other across the model and that it is essential to identify the most relevant factors at each level (Sallis et al., 2008); therefore, it is also possible that there are more relevant factors contributing to depressive symptoms at the relationship-, community-, and institutional- levels.

Results regarding the association between inpatient psychiatric treatment and depression were expected, as those already experiencing mental health challenges have likely been

identified and directed to mental health treatment. Interestingly, this study found restrictive housing to be associated with lower depressive symptom scores, though the effect size was very small. Recent systematic reviews and a meta-analysis show that restrictive housing and segregation were associated with more significant depression, anxiety (Luigi et al., 2020), psychological distress, and psychiatric morbidity (Brown, 2020); however, these results align with findings from a recent study using the SIRAP-C data to examine persistent self-injury (at least five days of self-injury within a 12-month period; American Psychiatric Association, 2022; Cramer et al., 2024). Engagement in persistent self-injury was associated with lower depressive symptom scores, suggesting that these symptoms may not be a key factor underlying non-suicidal SDV expression, motivations, and functions for this population (Cramer et al., 2024).

To address hypothesis two, the relationships between social connection across the SEM with suicidal and non-suicidal SDV events were examined. Hypothesis two was partially supported, as institutional-level social connection was significant in the full model for both SDV events. Restrictive housing placements were associated with a greater probability of both types of SDV events. These findings align with the substantial body of work investigating the impact of restrictive and isolating practices used in correctional settings, where the most restrictive placements (i.e., maximum security, solitary confinement, etc.) are distinctly associated with greater likelihood of suicidal and non-suicidal SDV occurrences (Dye, 2010; Favril, 2021; Favril et al., 2020, 2022; Zhong et al., 2021). The remaining social connection variables failed to meet significance in the full model, which is inconsistent with past research linking social connection (e.g., social isolation, visits, social support) with SDV in prisons (Favril et al., 2020, 2022; Marzano et al., 2016; Stoliker, 2018; Zhong et al., 2021). It has been suggested that individual-level factors are less powerful when using prison-level data to predict suicide (Dye, 2010;

Stoliker, 2018), which may be reflected in these findings. These results partially align with SEM assumptions as an external level influences the inner-most level; however, they do not align with the assumption that inner-most levels should influence an outcome most. The prison environment may create a social experience where the outer-most level of the SEM has the most significant impact on person-level outcomes.

Implications and Future Directions

These findings have several clinical and research implications. First, depression is the most common mental disorder reported in correctional settings (Maruschak & Bronson, 2021), an established risk factor for SDV (Favril, 2021; Favril et al., 2020; Zhong et al., 2021), and likely an appropriate target for mental health and SDV interventions for this population. These findings suggest that socially-based interventions targeting individual and relationship levels of social connection (e.g., social isolation, social support) may aid in reducing depressive symptoms; however, social support is reportedly lower for incarcerated persons with a mental health diagnosis (Kjellstrand et al., 2023). Further, modes of social connection in prisons (i.e., phone calls or visits) are typically inaccessible (e.g., associated with fees and restricted or censored; Wang, 2021). Evidence suggests that greater frequency of social contact with family during incarceration improves connectedness and predicts improved mental health up to a year after being released (Folk et al., 2019). Social connection in prisons could be improved by making current modes of communication more affordable and accessible (L. Wang, 2021), which some prison systems have done by enacting legislation to implement free phone calls and capping fees for in-state calls (Wagner & Bertram, 2022). Promoting more connectedness via current methods would likely help individuals feel less lonely and isolated by keeping them connected to family and friends.

Next, interpersonal social connection within the prison may help to protect against depressive symptoms by reducing person-level social isolation. Social connection between peers within the prison context could be fostered via peer recovery support services, work opportunities, and therapeutic interventions. Peer support refers to a model of care in which individuals with formal training and/or lived experience provide non-clinical support services to those recovering from mental illness and/or substance use disorder (McCrary et al., 2022). Research shows that these services help to improve social support, social functioning, and social skills, expand social networks (Repper & Carter, 2011), improve cohesion, and culture within the prison setting, and help to fill service gaps (South et al., 2016). At minimum, peer support services may provide meaningful social interactions for those in treatment and recovery from a mental illness (World Health Organization [WHO] et al., 2007). There are also therapeutic interventions such as interpersonal psychotherapy, a cost-effective and evidence-based treatment for major depression where individuals receive help in addressing current interpersonal problems (i.e., improve communication), which has demonstrated efficacy in correctional settings (Johnson et al., 2019).

There are also several in-prison mental health service implications. Current standards require an initial mental health screening within 14 days of admission (American Correctional Association, 2021; National Commission on Correctional Health Care [NCCHC], 2018) to identify those who should be prioritized for a mental health evaluation by a qualified healthcare professional (NCCHC, 2018); however, guidance regarding the frequency of screenings after admission is somewhat limited, with some standards simply dictating that routine follow-ups should be provided to those with identified mental health needs (“Standards for Psychology Services,” 2010). Prisons may benefit from implementing standardized mental health screenings

and assessments at admission and routinely throughout an individual's incarceration (World Health Organization et al., 2007). Utilization of mental health screenings, administered by a trained mental health professional, can help identify those at risk of mental health problems and aid in determining if changes in mental health status have occurred since admission or whether an individual was overlooked at initial screening.

Finally, these findings support evidence that SDV risk may be reduced by mitigating restrictive and isolating practices. There are calls to eliminate solitary confinement (American Public Health Association, 2013), which can be challenging, as this practice is used for a range of purposes (e.g., addressing misconduct or as preventative or protective measures for vulnerable individuals; K. James & Vanko, 2021). Despite this, there is a clear need for alternatives, several of which have already emerged. For example, NC has implemented TDUs (typically a 6-12 month stay) where multidisciplinary teams create treatment plans to divert individuals with serious mental illness away from long-term and/or repeated cycles of restrictive housing and towards treatment and program opportunities (NC Department of Public Safety, 2020; Remch et al., 2022). The TDU program has been associated with significantly lower rates of infractions, inpatient psychiatric service admissions, and SDV compared to restrictive housing (Remch et al., 2021); however, the sustainability of these effects is unclear. Evidence shows that individuals released from the TDU program are quicker to engage in SDV than their counterparts released from restrictive housing (Remch et al., 2022). More longitudinal research is needed to investigate the long-term impacts of these alternatives to determine their efficiency and effectiveness.

Limitations

This study has several limitations. First, this sample was derived from one state prison system and cannot be generalized across the U.S. Second, each year of data was collected for the

prior 12 months, which creates a ceiling effect for later years of data. Next, the SIRAP-C social connectedness subscale from which the social connectedness indicators were derived had marginal internal consistency (Cramer et al., 2022). This may indicate that these indicators do not adequately capture the underlying variable of social connection or the experience of social connection in the prison context (Cramer et al., 2022; DeVellis, 2017), which may be reflected in these findings. During model comparisons, the AIC and BIC values demonstrated stronger support for the null SDV model; however, the changes in AIC (range of 2-7; Burnham et al., 2011) and BIC (>10; Raftery, 1995) values show that there is some support for the more complex models. Finally, the assumption of independence of irrelevant alternatives (IIA) may have been violated. This assumption states that the probability of being in one of the three existing SDV event categories would not change if a fourth event category (i.e., self-injurious action, unknown lethal intent) were added (Cheng & Long, 2007). The IIA assumption could not be tested in STATA 18 since factorial variables are included in the model (UCLA Advanced Research Computing Statistical Methods and Data Analytics, n.d.), and current tests for IIA violations are unreliable (Cheng & Long, 2007); However, IIA violations may have been mitigated by employing the multinomial probit model, which relaxes this assumption (Cheng & Long, 2007).

Conclusion

In conclusion, we found support for associations between social connection and depressive symptoms across the SEM. Apart from support services and restrictive housing, all significant social connection variables shared an inverse association with depressive symptoms scores. We also found partial support for inverse associations between social connection and SDV as restrictive housing was linked to greater SDV risk. Clinical implications include increasing access to modes of social connection, implementing peer support programming and

socially-based interventions (e.g., interpersonal therapy), and reducing the use of restrictive housing, which may aid in combatting depressive symptoms and SDV risk.

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Table 4.1

Sample Characteristics

Variables		N (%)	M (SD)	Range
Sex	Male	2868 (74.38%)		
	Female	988 (25.62%)		
Race	White	1769 (45.88%)		
	Black	1821 (47.23%)		
	Hispanic	118 (3.06%)		
	Native American	130 (3.37%)		
	Other Racial Minority	18 (0.47%)		
Ability to Cope with Stress	Yes	2052 (53.22%)		
Chronic Medical Condition	Yes	1411 (36.59%)		
Current Suicidal Ideation	Yes	981 (25.44%)		
Current Suicidal Intention	Yes	632 (16.39%)		
Family History of Psychiatric Treatment	Yes	1153 (29.90%)		
History of Aborted Suicide Attempt	Yes	1154 (29.93%)		
History of Childhood Abuse	Yes	1736 (45.02%)		
Recent Significant Loss	Yes	614 (15.92%)		
Social Isolation	Yes	1411 (36.59%)		
Lack of family connections	Yes	1026 (26.61%)		
Responsibility to Loved Ones	Yes	3101 (80.42%)		
Supportive Family Relationships	Yes	3065 (79.49%)		
Social Support in the Institution	Yes	2314 (60.01%)		
Support Services	Outpatient Treatment	1835 (47.59%)		
	Inpatient/Residential Treatment	648 (16.80%)		
	No Treatment	1373 (65.61%)		
Housing Type	Dorm/Regular Population	927 (24.04%)		
	Single Cell	425 (11.02%)		
	Residential	22 (0.57%)		
	Inpatient/TDU	232 (6.02%)		
	Restrictive/RDU	2066 (53.58%)		
	Non-Housing Area	184 (4.77%)		
Age			34.70 (10.77)	18-92

Table 4.1 *(continued)*

Sample Characteristics

Disciplinary			16.76 (34.03)	0 - 426
Reason for Living			2.38 (0.97)	0 - 3
History of SDV			2.54 (1.75)	0 - 5
Current Suicide			0.81 (1.40)	0 - 4
Family History of Suicide			0.72 (1.02)	0 - 3
Coping Skills			1.07 (0.91)	0 - 2
Depressive Symptoms			1.41 (1.55)	0 - 5
SDV Event	Non-suicidal SDV	915 (23.73%)		
	Suicidal SDV Attempt	223 (5.78%)		
	No SDV Event	2718 (70.49%)		

Table 4.2

Hierarchical Linear Regression for Social Connection and Depressive Symptoms

Variable	Model 1 Null	Model 2 Individual	Model 3 Relationship	Model 4 Community	Model 5 Institutional	ω^2
Age	0.01***	0.01**	0.01**	0.01**	0.01*	.002
Sex	0.16**	0.24***	0.26***	0.19***	0.10	.001
White (Ref)	--	--	--	--	--	--
Black	-0.13**	-0.15***	-0.14***	-0.14**	-0.13**	.002
Native American	-0.10	-0.10	-0.10	-0.10	-0.10	-.000
Hispanic	-0.14	-0.04	-0.03	-0.03	0.00	-.000
Other racial minority	0.70*	0.65*	0.64*	0.61*	0.61*	.001
Disciplinary	-0.00***	-0.00***	-0.00***	-0.00***	-0.00***	.008
Able to Cope With Stress	-0.62***	-0.45***	-0.42***	-0.41***	-0.42***	.023
Chronic Medical Condition	0.21***	0.18***	0.18***	0.08***	0.16***	.003
Current Suicidal Ideation	0.73***	0.60***	0.59***	0.58***	0.57***	.019
Current Suicidal Intention	0.48***	0.44***	0.43***	0.43***	0.45***	.009
Family History of Psychiatric Inpatient Treatment	0.40***	0.32***	0.32***	0.31***	0.30***	.012
History of Aborted Suicide Attempt	0.39***	0.33**	0.33***	0.33***	0.32***	.013
History of Childhood Abuse	0.21***	0.18***	0.17***	0.17***	0.17***	.004
Recent Significant Loss	0.70***	0.60***	0.59***	0.59***	0.58***	.031
Individual-Level Social Connectedness Indicators						
Social Isolation	--	0.91***	0.85***	0.85***	0.88***	.092
Lack of Family Connections	--	0.07	0.02***	0.01	0.16	-.000
Responsibility to Loved Ones	--	-0.11*	-0.03***	-0.3	-0.02	-.000
Relationship-Level Social Connectedness Indicators						
Supportive Family Relationships	--	--	-0.14***	-0.14*	-0.12*	.001
Social Support in the Institution	--	--	-0.15***	-0.13***	-0.18***	.004

Table 4.2 *(continued)*

Hierarchical Linear Regression for Social Connection and Depressive Symptoms

Community-Level Social Connectedness Indicators						
Outpatient Treatment	--	--	--	0.02	0.01	-.000
Inpatient Treatment	--	--	--	0.26***	0.19**	.002
Institutional-Level Social Connectedness Indicators						
General/Dorm Housing (ref)	--	--	--	--	--	--
Single Cell Housing	--	--	--	--	-0.08	.000
Residential Housing	--	--	--	--	0.40	.000
Inpatient/TDU Housing	--	--	--	--	-0.03	-.000
Restrictive/RDU Housing	--	--	--	--	-0.28***	.007
Non-Housing Area	--	--	--	--	-0.40***	.004
F	F(15,3840) = 138.59, *p*<.001	F(18,3837) = 158.08, *p* <.001	F(20,3835) =143.83, *p*<.001	F(22,3833) =132.31, *p* <.001	F(27,3828) = 110.58 *p <.001*	
R^2	0.35	0.43	0.43	0.43	0.44	
ΔR^2	--	0.07	0.00	0.00	0.01	
ΔF	--	166.16***	9.38***	10.16***	8.94***	
AIC	12668.74	12203.76	12188.95	12172.56	12137.78	
BIC	12768.85	12322.64	12320.35	12316.48	12312.98	

Note. Unstandardized coefficients for all models and partial omega squared for the full model are reported.

**p<.05; **p<.01; ***p<.001*

Table 4.3

Hierarchical Multinomial Probit Regression of Social Connection and SDV Event - Average Marginal Effects

	Model 1			Model 2			Model 3			Model 4			Model 5		
Variables	**None**	**Non-suicidal SDV**	**Suicidal SDV**	**None**	**Non-suicidal SDV**	**Suicidal SDV**	**None**	**Non-suicidal SDV**	**Suicidal SDV**	**None**	**Non-suicidal SDV**	**Suicidal SDV**	**None**	**Non-suicidal SDV**	**Suicidal SDV**
Age	0.005*** (0.001)	-0.004*** (0.001)	-0.001** (0.000)	0.005*** (0.001)	-0.004*** (0.001)	-0.001** (0.000)	0.005*** (0.001)	0.005*** (0.001)	-0.001** (0.000)	0.005*** (0.001)	-0.004*** (0.001)	-0.001** (0.000)	0.004*** (0.001) [.004,.006]	-0.003*** (0.001) [-.005,-.004]	-0.001*** (0.000) [-.002,-.000]
Sex (male ref)	-0.044* (0.017)	0.037* (0.016)	0.007 (0.009)	-0.043* (0.017)	0.038* (0.016)	0.004 (0.008)	-0.039* (0.017)	0.035* (0.016)	0.003 (0.009)	-0.026 (0.018)	0.029 (0.017)	-0.002 (0.009)	-0.059*** (0.021) [-.099,-.019]	0.051*** (0.019) [.013,.089]	0.008 (0.010) [-.012,.028]
Race (White ref)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black	0.102*** (0.015)	-0.100*** (0.014)	-0.002 (0.008)	0.103*** (0.015)	-0.101*** (0.014)	-0.002 (0.008)	0.104*** (0.015)	-0.102*** (0.014)	-0.002 (0.008)	0.102*** (0.015)	-0.101*** (0.014)	-0.001 (0.008)	0.106*** (0.015) [.076,.136]	-0.104*** (0.014) [-.132,-.076]	-0.003 (0.008) [-.018,.013]
Other Racial Minority	0.019 (0.030)	0.016 (0.030)	-0.035* (0.011)	0.019 (0.030)	0.016 (0.030)	-0.035** (0.011)	0.020 (90.030)	0.015 (0.030)	-0.035** (0.010)	0.019 (0.030)	0.015 (0.030)	-0.035** (0.011)	0.022 0.030 [-.038,.081]	0.014 0.030 [-.044,.072]	-0.036** 0.010 [-.056,-.016]
Disciplinary Infractions	-0.001*** (0.000)	0.001*** (0.000)	-0.000 (0.000)	-0.001*** (0.000)	0.001*** (0.000)	-0.000 (0 .000)	-0.001*** (0.000)	0.001*** (0.000)	-0.000 (0.000)	-0.001*** (0.000)	0.001*** (0.000)	-0.000 (0.000)	-0.001*** (0.000) [-.001,-.000]	0.001*** (0.000) [.000,.001]	-0.000*** (0.000) [-.000,.000]
Depressive Symptoms	0.006 (0.006)	-0.019** (0.005)	0.013*** (0.002)	0.005 (0.006)	-0.020*** (0.006)	0.015*** (0.003)	0.005 (0.006)	-0.020*** (0.006)	0.015*** (0.003)	0.005 (0.006)	-0.020*** (0.006)	0.015*** 0.003)	0.003 (0.006) [-.008,.015]	-0.018** (0.006) [-.029,-.008]	0.015*** (0.003) [.010,.021]
Reasons for Living	0.011 (0 .010)	0.005 (0.009)	-0.015*** (0.004)	0.010 (0.011)	0.007 (0.010)	-0.018*** (0.005)	0.012 (0.011)	0.006 (0.010)	-0.019*** (0.005)	0.011 (0.011)	0.006 (0.010)	-0.018*** (0.005)	0.011 (0.011) [-.009,.032]	0.006 (0.010) [-.013,.026]	-0.018*** (0.005) [-.027,-.008]
History of SDV	-0.021*** (0.004)	0.018*** (0.004)	0.003 (0.002)	-0.022*** (0.004)	0.019*** (0.004)	0.003 (0.002)	-0.022*** (0.004)	0.018*** (0.004)	0.003 (0.002)	-0.020*** (0.005)	.017*** (0.004)	0.003 (0.002)	-0.020*** (0.005) [-.029,-.011]	0.017*** (0.004) [.009,.026]	0.003 (0.002) [-.002,.008]

Table 4.3

Hierarchical Multinomial Probit Regression of Social Connection and SDV Event - Average Marginal Effects

Current Suicide	0.011 (0.007)	-0.025*** (0.006)	0.014*** (0.003)	0.011 (0.007)	-0.025*** (0.006)	0.014*** (0.003)	0.011 (0.007)	-0.025*** (0.006)	0.014*** (0.003)	0.011 (0.007)	-0.025*** (0.006)	0.014*** (0.003)	0.012 (0.007) [-.001,.025]	-0.025*** (0.006) [-.038,-.012]	0.013*** (0.003 [.008,.019]
Coping Skills	0.052*** (0.010)	-0.049*** (0.008)	-0.003 (0.005)	0.052*** (0.009)	-0.048*** (0.008)	-0.004 (0.005)	0.055*** (0.009)	-0.05*** (0.009)	-0.005 (0.005)	0.054*** (0.009)	-0.049*** (0.009)	-0.004 (0.005)	0.050*** (0.009) [.032,.068]	-0.046*** (0.009) [-.063,-.030]	-0.004 (0.005) [-.013,.006]
Individual-Level Social Connection															
Social Isolation	--	--	--	-0.003 (0.017)	0.013 (0.016)	-0.010 (0.008)	-0.012 (0.018)	0.020 (0.016)	-0.008 (0.008)	-0.011 (0.018)	0.020 (0.016)	-0.009 (0.008)	-0.001 (0.018) [-.036,.033]	0.013 (0.017) [-.020,.045]	-0.011 (0.008) [-.028,.005]
Lack of Family Connections	--	--	--	0.033* (0.017)	-0.022 (0.016)	-0.011 (0.008)	0.028 (0.018)	-0.022 (0.017)	-0.006 (0.009)	0.029 (0.018)	-0.023 (0.017)	-0.006 (0.009)	0.028 (0.018) [-.008,.063]	-0.022 (0.017) [-.055,.011]	-0.00 (0.009) [-.023,.011]
Responsibility to Loved Ones	--	--	--	0.008 (0.022)	-0.018 (0.021)	0.009 (0.009)	0.014 (0.024)	-0.018 (0.023)	0.004 (0.010)	0.015 (0.024)	-0.019 (0.023)	0.003 (0.010)	0.015 (0.024) [-.0542,.0365]	-0.01 (0.023) [-.0477,.0387]	0.00 (0.010) [-.005,.032]
Relationship-Level Social Connection															
Supportive Family Relationships	--	--	--	--	--	--	-0.010 (0.023)	-0.004 (0.022)	0.014 (0.010)	-0.011 (0.023)	-0.004 (0.022)	0.015 (0.009)	-0.009 (0.023) [-.054,.037]	-0.005 (0.022) [-.048,.039]	0.013 (0.010) [-.005,.032]
Social Support in the Institution	--	--	--	--	--	--	-0.029 (0.017)	0.023 (0.016)	0.006 (0.008)	-0.027 (0.017)	0.022 (0.016)	0.005 (0.008)	-0.028 (0.017) [-.061,.005]	0.022 (0.016) [-.009,.053]	0.006 (0.008) [-.011,.022]
Community-Level Social Connection (Support Services)															
Outpatient Treatment	--	--	--	--	--	--	--	--	--	-0.017 (0.017)	0.013 (0.016)	0.003 (0.008)	-0.019 (0.017) [-.053,.014]	0.015 (0.016) [-.017,.046]	0.004 (0.008) [-.012,.020]
Inpatient Treatment	--	--	--	--	--	--	--	--	--	-0.045 (0.024)	0.026 (0.022)	0.019 (0.012)	-0.053* (0.025) [-.102,-.004]	0.027 (0.023) [-.019,.073]	0.026 (0.013) [.001,.051]
Institutional-Level Social Connection (Housing Type)															
Dorm Housing (ref)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Single Cell Housing	--	--	--	--	--	--	--	--	--	--	--	--	-0.03 (0.026) [-.087, .016]	0.01 (0.024) [-.036, .059]	0.02 (0.013) [-.001, .050]
Residential Housing	--	--	--	--	--	--	--	--	--	--	--	--	-0.113 (0.091) [-.308 ,.082]	0.08 (0.095) [-.098,.275]	0.025 (0.044) [-.061 ,.110]

Table 4.3

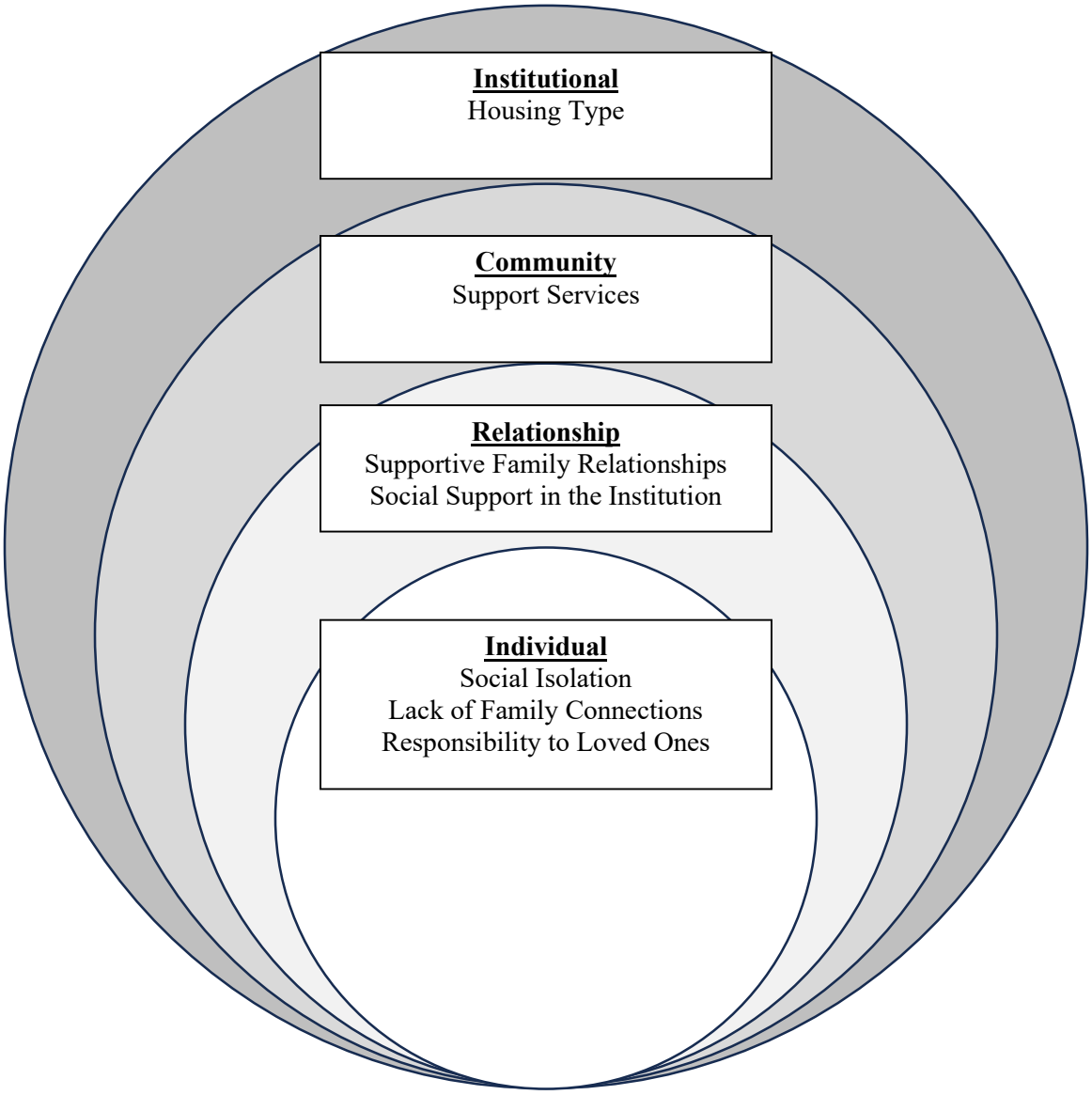
Hierarchical Multinomial Probit Regression of Social Connection and SDV Event - Average Marginal Effects

Inpatient/TDU Housing	--	--	--	--	--	--	--	--	--	--	--	--	-0.060 (0.033) [-.125 ,.005]	0.050 (0.031) [-.012,.111]	0.011 (0.014) [-.016, .038]
Restrictive/ RDU Housing	--	--	--	--	--	--	--	--	--	--	--	--	-0.083*** (0.020) [-.122, -.044]	0.054*** (0.019) [.017,.091]	0.029*** (0.009) [.011, .048]
Non-Housing Area	--	--	--	--	--	--	--	--	--	--	--	--	-0.039 (0.036) [-.109, .0310]	0.021 (0.033) [-.044, .087]	0.018 (0.017) [-.016 ,.051]
Count R^2	0.71		0.71		0.71		0.71		0.71						
Overall X^2	$X^2(20) = 433.29$, $p < .001$		$X^2(26) = 439.65$, $p < .001$		$X^2(30) = 443.75$, $p < .001$		$X^2(34) = 447.53$, $p < .001$		$X^2(44) = 462.38$, $p < .001$						
AIC	5379.18		5382.32		5385.17		5388.15		5386.27						
Δ AIC	--		3.14		5.99		8.97		7.09						
BIC	5516.84		5557.53		5585.40		5613.42		5674.11						
Δ BIC	--		40.69		68.16		96.58		157.27						

Note. Average marginal effects are reported with standard errors in parentheses for all models and 95% confidence intervals in brackets for the full model.
**p<.05; **p<.01; ***p<.001*

Figure 4.1

A Social-Ecological Framework for Social Connectedness Within a Correctional Setting.



Note. Adapted from the National Center for Injury Prevention and Control, Division of Violence Prevention, (2002). *The Social-Ecological Model: A Framework for Violence Prevention*.

CHAPTER 5: DISCUSSION

Suicide, self-injury, and depression are global public health concerns that significantly impact well-being and quality of life (World Health Organization, 2014, 2023). People who are incarcerated in U.S. prisons experience higher rates of depression and SDV compared to people in the general U.S. population. SDV in prisons is costly in terms of physical and psychological harm, safety, and resources (DeHart et al., 2009; Smith & Kaminski, 2011). It is imperative to effectively evaluate and combat SDV risk for this population, which requires a better understanding of the most salient risk factors and the implications for SDV risk assessment procedures. This dissertation sought to determine if there are variations in risk factors for self-directed violence (SDV) based on demographic characteristics and to examine the associations between different forms of social connection, a key risk factor, with depression and SDV for those incarcerated in U.S. prisons.

SDV risk factors are sociodemographic, historical, clinical, custodial, and criminological in nature (Favril et al., 2020, 2022; Marzano et al., 2016; Zhong et al., 2021). However, few of these factors can be changed, especially in the context of prison. Social connection is one of the few factors that acts as both a risk and protective factor for these outcomes and is modifiable within the context of prison. Therefore, social connection served as primary exposure for two of the studies. Study one synthesized evidence of associations between social connection with depression and SDV for samples of individuals incarcerated in U.S. prisons across the SEM. Study two examined demographic variation in SDV risk assessment subscale scores, including measures of individual-level and relationship-level social connection, to determine if there were between-group differences regarding SDV risk factors for a state prison system sample. Finally,

study three investigated the impact of social connection across the SEM on depressive symptoms and SDV event outcomes for a state prison system sample.

Summary of Findings

SDV Risk Factors and Risk Assessment

Study two assessed demographic variation in SDV risk assessment subscale scores using SIRAP-C data. This study also helps to provide initial insight regarding the SIRAP-C tool's applicability across different demographic groups and contributes to our understanding of these differences amongst the correctional population. Negligible differences were found across most comparisons as significant findings were likely statistical artifacts of the large sample size; thus, meaningful age- and sex-based variations were not observed. These findings are somewhat inconsistent with evidence of differences in SDV risk based on age (e.g. younger adults at greater risk of SDV; Stoliker, 2018) and sex (e.g., incarcerated men at greater risk of suicide; Zhong et al., 2021); yet do align with reports of no association between age and SDV risk for this population (Marzano et al., 2016). Though there was no meaningful variation, age appeared to be inversely associated with social connection, as social connection scores decreased with age. There were also slight differences in average social connectedness scores between men and women, with women scoring higher. These findings align with prior evidence reporting that social connection decreases as individuals age older age is associated with less social connection (Conwell et al., 2011; National Council on Aging, 2024) and that women tend to experience more social connection than men while incarcerated (Jiang & Winfree, 2006). Overall, these findings may suggest that for those who are incarcerated in this state prison system, differences in the salience of SDV-related risk factors may be attributable to characteristics or factors outside

of age and sex; however, these characteristics may still play a role in how much social connection one experiences.

Meaningful race-based variations were observed in comparisons of the Other racial minority group (consisting of those categorized as Asian and Other) with Black and Native American individuals for depressive symptoms, with the former group scoring significantly higher. Though the effect was large, it is noted that these results may not be a true reflection of depressive symptoms for this group as they represented less than 1% of the total sample. Meaningful variations were also observed between White and Hispanic individuals for personal and family histories of SDV, with White individuals scoring significantly higher, though the effects were small. These findings align with evidence that White individuals are reportedly more likely to experience mental illness or have a history of suicide over (National Institute of Mental Health, 2023; Stoliker & Galli, 2021). These findings may partially support the notion that SDV-related thoughts and behaviors are a product of an underlying cultural mechanism. However, we do not yet have a sufficient understanding as to why (Stoliker & Galli, 2021).

Additionally, these findings suggest that racial and ethnic identity may play a role in the salience of some SDV-related risk factors for individuals incarcerated within this prison system, especially those who identify as White. Regarding race and social connection, average subscale scores were similar across racial groups (range 2.33 - 2.40), and Hispanic individuals had the highest scores. While it is noted that Hispanic individuals only represented about 3% of the sample, these findings suggest that individuals in this sample experience similar levels of social connection and that Hispanic individuals may experience slightly more. Altogether, these findings demonstrated that the SIRAP-C can likely be applied to incarcerated individuals with varying demographic characteristics, as there appear to be few differences in experiences of

social connection within a correctional environment. This could also be evidence of the strong influence of prison-level factors, which appears to be the most relevant factor in terms of SDV risk and behaviors.

Multilevel Examinations of Social Connection

Social Connection and Depression. In the systematic review (study one), there was evidence of positive and inverse associations between social connection and depression at each level of the SEM. Lower degrees of social connection at the individual (e.g., loneliness) and institutional (restrictive housing) levels were associated with experiencing more depressive symptoms (Gallegos et al., 2021; Moore et al., 2021). Higher degrees of carceral trust (relationship), perceived social support (relationship), satisfaction with social relationships (relationship), greater carceral network size (community), receiving support from spiritual activities (community), and understanding prison norms (institutional) appeared to protect against depressive symptoms (Archuleta et al., 2020; Levitt & Loper, 2009; Moore et al., 2021; Tadros et al., 2022).

Results from study three somewhat echoed these findings. Statistically significant associations were found between social connection and depressive symptoms at each level of the SEM, though most effect sizes were very small. The only moderate effect was found at the individual-level, where social isolation or lower degrees of social connection were associated with higher depressive symptoms subscale scores. Higher degrees of social connection at the relationship-level, such as supportive family relationships and social support in the institution, were significantly associated with lower scores. Social connection at the community-level, in the form of inpatient psychiatric treatment, was associated with higher depressive symptom scores. The small effect sizes for these associations indicate that the significance is an artifact of the

sample size; however, they may also reflect assumptions of the SEM in which effects at external levels are not as direct, or proximate as inner levels (Bronfenbrenner, 1994; Kilanowski, 2017). Together, these findings suggest that depression in this prison system could likely be mitigated by increasing connectedness at the relationship- and community-levels and by reducing the use of practices and policies that may reduce degrees of connectedness.

One interesting finding that emerged from study three was the significant association between restrictive housing placements and lower depressive symptom scores. This does not align with prior research showing that a lack of social connection at the institutional-level, specifically in the form of restrictive housing, is linked to higher scores on measures of depression (Brown, 2020; Luigi et al., 2020). However, these results are consistent with recent findings on persistent self-injury using the SIRAP-C data (Cramer et al., 2024). This evidence implies that non-suicidal SDV motivations and expression may look different for individuals who are incarcerated (Cramer et al., 2024), and that other factors may be more salient than experiencing depressive symptoms.

Social Connection and Self-directed Violence. Studies one and three explored the relationship between social connection and SDV risk. The systematic review (study one) examined suicide, suicidal and non-suicidal SDV, and suicide ideation. Findings indicated support for associations between social connection and these outcomes at the individual, relationship, and institutional-levels of the SEM. Less social connection at the individual (e.g., loneliness) and institutional-levels (e.g., segregated housing, single-cell housing, restrictive housing units) were associated with greater SDV risk (Jones, 1986; Moore et al., 2021; Reeves & Tamburello, 2014). Perceived social support (relationship), as well as interpersonal support from family and the prison (relationship), shared an inverse relationship with suicide ideation (Dye & Aday, 2013; Richie et

al., 2021). There was only partial support for the SDV model in study three, as only institutional-level social connection was significant in the full model. These findings indicated that the most restrictive housing placements within the NC prison system were significantly associated with a higher probability of suicidal and non-suicidal SDV events.

Implications for Research, Theory and Practice

Identified Literature Gaps and Research Implications

This dissertation research identified several gaps in the literature regarding social connection, depression, and SDV for those incarcerated in U.S. prisons. First, there is a limited body of work examining social connection as an exposure of interest for SDV-related and depression outcomes in prisons, specifically for non-suicidal SDV. Further, there are limited multilevel investigations of these associations, with studies often limiting their inquiry to just one or two levels of the SEM. The systematic review revealed a lack of research exploring community-level social connection, and studies often failed to utilize multidimensional constructs and measures of social connection. Finally, research has failed to sufficiently examine the ways in which demographic characteristics influence the risk factors associated with these outcomes. The research theoretical implications related to these literature gaps and the findings from this dissertation research are discussed below.

First, future research should make considerations for the depth and multilevel nature of social connection constructs. In the systematic review (study one), social capital was the only construct that embodied the multidimensional nature of social connection; however, the measures of this construct were limited and lacked conceptual depth (Archuleta et al., 2020). There is a need for research that examines social connection as a multidimensional construct or uses multiple constructs to capture multiple levels of social connection, as well as the

development and use of measures that can capture this multidimensionality. The systematic review also demonstrated that more research is needed to explore the impact of community- and institutional-level social connection on depression as well as individual- and community-level social connection on SDV, as few studies investigated these associations. Greater insight regarding these associations would aid in identifying whether other levels of social connection can aid in mitigating these outcomes for those incarcerated. Additionally, most studies included in the systematic review were cross-sectional, suggesting a need for more longitudinal research that investigates these associations over time, which may be important for individuals incarcerated for extended lengths of time.

These findings also appeared to at least partially align with SEM assumptions as there was evidence in study one of influence from external domains to internal domains (Sallis et al., 2015); however, the body of work exploring multilevel influences in the systematic review was limited. More research is needed to better comprehend how social connection interacts across the SEM. Investigating the nature of the relationships between various levels of social connection would provide a better understanding of how intervention and prevention strategies at one level, may impact outcomes or factors that occur at other levels. Though, it is noted that expanding our understanding of the interactions across levels may be challenging, as there are likely multiple factors operating at each level, which makes it difficult to identify which are the most relevant (Sallis et al., 2015).

There are also several research implications regarding identity and SDV risk factors. First, additional research is needed to explore how demographic characteristics may moderate associations between SDV and associated risk factors. The lack of meaningful variation in subscale scores across groups implies that the SIRAP-C is applicable across groups; however,

there is substantial evidence that there are age-, race-, and gender-based differences regarding the expression of SDV risk factors (Centers for Disease Control and Prevention, 2023; Favril et al., 2022; Zhong et al., 2021). More research is needed to further clarify any differences in SDV-related risk factors based on demographic characteristics as identity and culture likely inform how individuals think, feel, and engage in SDV-related thoughts and behaviors.

Additionally, there is little understanding of the impact of intersectionality, the intersection of one's identities, on these associations (Standley, 2022). The burden of SDV falls on certain groups, and this burden may be compounded when an individual belongs to multiple groups significantly impacted by SDV. Future studies should also consider how intersectionality, or belonging to multiple groups, may influence SDV and related risk factors. Overall, further research into the connection between identity and SDV would contribute to our understanding of how identity and culture impact SDV, as well as the motivations and expressions underlying these outcomes for this population. This would likely enable the development of more effective prevention and intervention strategies for individuals of diverse backgrounds.

Theoretical Implications

Some support was found for SEM assumptions through this dissertation research. For example, social isolation had the most meaningful effect on depressive symptoms, which aligns with SEM assumptions that the individual-level should have the strongest influence on a behavior (Bronfenbrenner, 1994; Kilanowski, 2017). Contrary to this assumption, restrictive housing placements at the institutional-level were found to have the most significant impact on suicidal and non-suicidal SDV. These results are consistent with prior work, which suggests that prison-level factors may supersede factors at other levels (Dye, 2010; Stoliker, 2018). It is possible that extreme forms of restriction and physical isolation are the most relevant forms of

social connection in terms of SDV risk for this population. It is also likely that these findings reflect the compounded consequences linked to segregation and restriction in some prison environments. The most restrictive facilities or placements (e.g., maximum security) are associated with the most deprivation (e.g., loss of security, autonomy, resource, etc.; Dye, 2010), likely because transferring from dorm or regular housing to segregation or solitary results in additional loss to those already experienced through incarceration.

These findings also have several implications regarding the interpersonal theory of suicide (ITS). Prior research on ITS, specifically thwarted belongingness, is somewhat mixed (Chu et al., 2017; Ma et al., 2016). In correctional settings, it has been found that the interaction of thwarted belongingness (unmet need to belong) and perceived burdensomeness (feeling like a burden to others) is positively associated with suicidal thoughts and behaviors (Cain & Ellison, 2022; Mandracchia & Smith, 2015); however, it has been reported that this is only true when high levels of perceived burdensomeness are present (Mandracchia & Smith, 2015). Perceived burdensomeness was not accounted for in this dissertation research, and thus assertions cannot be made regarding the combined impact of thwarted belongingness and perceived burdensomeness on SDV. However, it is possible that perceived burdensomeness may have a meaningful effect on the relationship between thwarted belongingness (the absence of social connection) and SDV, resulting in less meaningful effects of thwarted belongingness directly on SDV. Therefore, these findings may be consistent with prior work showing that thwarted belongingness is not predictive of SDV-related outcomes alone (Mandracchia & Smith, 2015), but, it is important to note that there is a substantial body of work indicating a meaningful effect of institutional-level social connection alone (e.g., single-cell housing, solitary confinement, administrative segregation) on SDV, leading to an increase in the risk of SDV-related thoughts and behaviors

(Favril, 2021; Favril et al., 2020, 2022; Haney, 2018; Zhong et al., 2021). These findings may also demonstrate that institutional-level factors supersede those at other levels, specifically in correctional environments.

Clinical and Practical Implications

These findings may also inform clinical and practical implications related to social connection in correctional settings, mental health care, and restrictive policies and practices. First, correctional facilities should strive to capitalize on the protective effects of social connection by implementing methods to increase social interaction for incarcerated individuals at each level of the SEM. This can be achieved through both formal and informal interventions. For example, social isolation and loneliness (individual-level) may be improved informally by increasing the accessibility of phone and video calls with loved ones (relationship-level) or fostering better relationships between incarcerated individuals and staff (community-level).

There are also formal interventions such as Caring Contacts (relationship-level) and interpersonal psychotherapy (IPT; community-level). Caring Contacts involves sending personalized letters, postcards, or text messages over a period of time to demonstrate care and concern for an individual, which may help to establish a greater sense of social support (Skopp et al., 2023). IPT is an evidence-based treatment program for major depressive disorder that focuses on four areas of interpersonal crises such as “an interpersonal dispute, a change in life circumstances, grief, or social isolation” (Johnson et al., 2019, p. 4). IPT has demonstrated efficacy in correctional settings, leading to significant decreases in depression severity (Johnson & Zlotnick, 2008) and higher rates of remission from major depressive disorder (Johnson et al., 2019) compared to prison mental health treatment.

It is also possible that social connection can be fostered at multiple levels through one intervention that addresses factors at different levels of the SEM. For example, peer support programs promote recovery from mental health and substance use disorders through trained individuals with lived experience who provide non-clinical support services (McCrary et al., 2022). These programs have been credited with improving social connection at the interpersonal (i.e., social support), community (i.e., expanding social networks; Repper & Carter, 2011), and institutional-levels (i.e., improving prison culture; South et al., 2016). An additional recommendation to address mental health care in correctional facilities is to implement routine and standardized mental health screenings for the duration of an individual's incarceration. Current standards dictate that mental health screenings must be performed during admission (American Correctional Association, 2021); however, further guidance regarding the frequency of these screenings is limited. Periodic routine screenings may help to identify those initially overlooked at admission and monitor changes to an individual's mental health status over time.

Next, significant reductions in SDV risk for incarcerated individuals are unlikely to occur without implementing institutional-level changes. First and foremost, it is recommended to reduce the use of segregation, solitary confinement, and restrictive housing. To achieve this, scholars and professional organizations have recommended the following: 1) use restrictive housing as a last resort, 2) never use solitary for juveniles (under the age of 18) or for individuals with a mental illness, 3) consistently monitor the mental health of those placed in solitary confinement, 4) eliminate the use of restrictive housing for promoting security or punishment, 5) if segregation is deemed necessary, it should be within the least restrictive conditions possible and limited to short durations, and 6) correctional systems should consider implementing alternatives to segregation and other isolating practices (ABA, 2011; American Public Health

Association, 2013; Haney, 2018). The significance of social connection at the institutional-level, as evidenced by this research and prior work, suggests that institutional-level changes are necessary to mitigate SDV risk and improve the physical and mental health of incarcerated individuals

Finally, in line with the core principles of ecological models of health behavior (Sallis et al., 2008), evidence has shown that effective suicide prevention in correctional settings addresses all significant categories of SDV risk factors "…through the use of comprehensive multi-factored prevention programs" (Barker et al., 2014, p. 238). Therefore, the final recommendation is for correctional systems to work towards implementing "best practices" for suicide prevention and response. The recommended best practices take place across the SEM as they fall into the domains of policy oversight (e.g. medical or mental health staff reviews SDV prevention policies), staff training (e.g., mandated comprehensive SDV prevention training), suicide assessment and management (e.g., screening to identify an address SDV-related risk factors), and response to suicide and suicide attempts (e.g., immediate intervention from medical and mental health staff to begin life-saving measures; Cramer et al., 2017). However, it is important to note that best practices are not mandated by law (Tartaro & Alas, 2024). A recent analysis of suicide prevention policies in U.S. state and federal prisons found that within 39 correctional departments, only half of the recommended "best practices" were implemented on average (Tartaro & Alas, 2024), demonstrating a need to increase the use of best practices across state and federal prisons systems to effectively reduce SDV in prison.

Limitations

The findings from this dissertation research should be considered in the context of their limitations, which include generalizability, low counts for some data indicators, and predictive

performance. Study one did not include all types of correctional facilities, limiting generalizability to non-prison correctional facilities. Additionally, the search conducted in study one was not exhaustive and may be susceptible to publication bias, leading to the failure to locate studies of practical significance and underestimation of the results (Garg et al., 2008; Mohseni et al., 2022). The samples for studies two and three were derived from one state prison system, which limits generalizability to other state prison systems. In study three, whether the Independence of Irrelevant Alternatives (IIA) assumption was violated was unclear. This assumption could not be assessed in STATA 18 due to including factorial variables in the model (UCLA Advanced Research Computing Statistical Methods and Data Analytics, n.d.); however, violations of IIA may have been mitigated by using the multinomial probit model, which relaxes this assumption (Cheng & Long, 2007). Finally, there are also potential limitations related to the internal consistency of the social connectedness indicators. In the parent SIRAP-C development study, the social connectedness subscale reached marginal internal consistency in confirmatory and exploratory factor analyses. It is possible that these indicators may not adequately capture the phenomenon or experience of social connection for individuals incarcerated in prison (Cramer et al., 2022; DeVellis, 2017).

Conclusion

This dissertation research focused on examining risk factors for self-directed violence in U.S. prisons, with a special emphasis on the role of social connection as both a risk and protective factor. These findings contribute to existing research by (1) providing initial insights into the applicability of a correctional SDV risk assessment tool and how demographic characteristics are associated with SDV risk factors, (2) using a multilevel approach to examine social connection, (3) identifying current gaps in the carceral literature regarding social

connection, SDV, and depression, and (4) identifying areas of clinical and practical intervention for the mitigation of SDV and depression among individuals incarcerated in prison. This research helps to create a foundation for multilevel research of social connection in correctional settings and potential socially based prevention efforts and strategies to reduce depression and SDV risk for incarcerated individuals

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