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A Population-based Assessment of Suicide Risk

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UNIVERSITY OF MIAMI

A POPULATION-BASED ASSESSMENT OF SUICIDE RISK

By

Summer D. DeBastiani

A DISSERTATION

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
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the requirements for the degree of
Doctor of Philosophy

A POPULATION-BASED ASSESSMENT OF SUICIDE RISK

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Suicide is the 10th leading cause of death in the U.S., and suicide rates in Monroe County, Florida are among some of the highest in the state. The purpose of this dissertation was threefold: (1) analyze the concept of suicide lethality to clarify the concept through the identification of antecedents, attributes and consequences; (2) identify suicide risk factors to target for prevention in Monroe County, Florida; and (3) identify the sociodemographic characteristics associated with selective nonresponse to suicide risk questions. The two methods used in this dissertation were six stages of the Walker and Avant concept analysis method to literature search findings that included articles published in the English language between 1970 and 2016 using MEDLINE, the Cochrane Library, Pubmed, Psychlit, Ovid, PsychInfo and Proquest, and secondary analysis of the 2016 Monroe County Behavioral Risk Factor Surveillance Survey (BRFSS) of adult residents ($n = 528$). Univariate analyses, Chi Square tests and multivariate logistic regression using weights and strata to account for the complex survey design were conducted to generate prevalence estimates, standard errors, 95% confidence intervals and hierarchical regression models. Variables of interest included suicidal behavior questions, self-reported demographics, mental illness, physical illness, access to health care, and socio-economic status (SES) and suicide risk question
nonresponse. Findings of the secondary analysis were, of those who responded, 7.34% \((n = 49, CI = 4.27-10.41)\) were at risk for suicide in Monroe County, FL. Notably, persons at risk for suicide were more likely to be renters \((63.5\%, n = 19, CI = 43.53-80.52)\) than persons not at risk \((36.9\%, n = 86, CI = 28.53-43.29)\). 32% \((n = 109, CI = 26.5-38.4)\) of the population did not respond to suicide risk questions. Sociodemographic characteristics of suicide risk question nonresponse were comparable to the characteristics of individuals identified as being at risk for suicide. Hispanics were more likely to not respond to suicide risk questions than any other race or ethnicity \((AOR = 2.2, CI = 1.14-4.39)\). The concept analysis differentiated between suicide, lethality, suicidal behavior, and suicide lethality. Presence of a suicide plan or a written suicide note was not found to be associated with the majority of completed suicides with suicide lethality. Implications of this dissertation for suicide prevention clinical practice, research and policy include the need for practice to be guided by the clearer definition of the concept of suicide lethality. The findings of this dissertation support the development and testing of preventative nursing screening interventions to help reduce the incidence of suicide. Future studies investigating population-based suicide risk should also assess housing status as a possible indicator of SES. Advocating for more affordable housing could possibly help decrease suicide behavior in high risk areas.
DEDICATION

I dedicate my dissertation work to Bryan Weirich, Larue Williams and George Gilkes for their love, endless support, belief and constant encouragement. I will always appreciate all that you have done and sacrificed to help me along this journey.

This dissertation is also dedicated to my step-father and all those who chose suicide, as well as the friends and families who survive them. I wish more could have been done to intervene.
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Chapter 1
Significance of Suicide in the United States
U.S. suicide rates are increasing and reaching epidemic proportions (American Association of Suicidology [AAS], 2014; Suicide Prevention Resource Center [SPRC], 2015). Rates have increased from 10.4 to 13.26 (per 100,000 individuals) from 2000 through 2015 (American Association of Suicidology, 2014; Centers for Disease Control and Prevention [CDC], 2017; SPRC, 2015). Suicide in the U.S. now occurs more often than homicide or AIDS related deaths (CDC, 2014). The human and economic costs of suicide affect families, communities and society in general (AAS, 2014; McIntosh & Drapeau, 2014). The mortality burden combined with the negative emotional and mental health effects associated with the family and friend survivors of suicide victims can be debilitating (AAS, 2014). The purpose of this chapter is to describe the prevalence of suicide in the general U.S. population, discuss the associated impact of suicide outcomes on society, families and the economy, and make suggestions for future directions for suicide research.

**Prevalence of Suicide**

In 2015, 44,193 people in the U.S. died by suicide, equating to 121 deaths per day at a rate of 13.26 deaths per 100,000 individuals (AAS, 2014; SPRC, 2015). These figures amount to 1.6% of total U.S. deaths in 2015 (CDC, 2017; SPRC, 2015). Within the U.S., suicide is the 10th leading cause of death compared to other violent deaths, such as homicide, which is ranked 17th (AAS, 2014). From 1980 to 2000, U.S. suicide rates gradually decreased from 12.3 to 10.40 deaths per 100,000 individuals) (AAS, 2014; McIntosh & Drapeau, 2014). However, since 2012, suicide rates have been on the rise, gradually increasing each year until peaking in 2015 to a rate of 13.26 per 100,000
population (AAS, 2014; McIntosh & Drapeau, 2014). Suicide rates are lowest in the Northeastern Atlantic states, and highest in the western and mid-west Mountain states (AAS, 2014; McIntosh & Drapeau, 2014). From 2004 through 2015, the five states with the highest suicide rates have consistently been: Alaska, Montana, Nevada, New Mexico, and Wyoming (AAS, 2014; CDC, 2017; McIntosh & Drapeau, 2014). Caucasian, men from Western Mountain states account for 70% of U.S. suicides (AAS, 2014; CDC, 2017; McIntosh & Drapeau, 2014). While men in general are four times more likely than women to die by suicide in the U.S., women attempt suicide three times more often than men (AAS, 2014; SPRC, 2015; World Health Organization [WHO], 2015) In the U.S., it is estimated that there are 25 attempts for every death by suicide in the nation (AAS, 2014; SPRC, 2015).

Societal and Familial Impact of Suicide

Annually, millions of people are bereaved through suicide (AAS, 2014; Cerel, Jordan, & Duberstein, 2008; Cerel, McIntosh, Neimeyer, Maple, & Marshall, 2014). Individuals who experience a direct loss to suicide, such as the loss of a family member, friend or colleague, are referred to as suicide survivors (AAS, 2014). If a suicide occurs every 12.3 minutes in the U.S., then there is also a projected 18 new suicide survivors every 12.3 minutes (AAS, 2014). In 2014, it was estimated that 1 out of every 21 Americans was a suicide survivor (AAS, 2014). Suicidal deaths create survivor problems such as social blame, stigma, and isolation (Jordan, 2008; Pompili, Maurizio, et al., 2013). Many suicide survivors experience social isolation (CDC, 2011; Cerel, Jordan, & Duberstein, 2008; Knox, Conwell, & Caine 2004; Pompili, Maurizio, et al., 2013). For
example, suicide survivors are judged more negatively in social networks than survivors of other deaths (Cerel, Jordan, & Duberstein, 2008; Jordan, 2008; Pompili, Maurizio, et al., 2013). Consequently, suicide survivors often choose to isolate or are ostracized from their social circles (AAS, 2014; Lohan & Murphy, 2002; Pompili, Maurizio, et al., 2013). The ensuing isolation from friends, family and other members of society results in a lack of needed emotional support during the bereavement process, extending the duration of bereavement for the survivor (AAS, 2014; Jordan, 2008). Moreover, the survivor’s feelings of humiliation, guilt and self-blame often lead to psychological distress, and straining and breakdown of family cohesion (Cerel, Jordan, & Duberstein, 2008; Jordan, 2008; Pompili, Maurizio, et al., 2013; Sveen, & Walby, 2008).

Family grief, guilt, strain and sometimes breakdown of family cohesion are consequences of suicide for survivors (CDC, 2011; Resnick & Hathorne, 1973; Sveen, & Walby, 2008). Family survivors frequently struggle with understanding why the suicide occurred and whether they could have helped to prevent it (AAS, 2014). They are left with grief and confusion while attempting to move forward past the devastating incident (Cerel, Jordan, & Duberstein, 2008; Cerel, et al, 2014). Emotional pain and remorse at the waste of life of the suicide victim often leaves them angry (Hawton & Van Heeringen, 2000, p.475). For example, women whose husbands had died by suicide experienced more self-guilt and self-blame than widows who lost a husband from an accident (McNiel, Hatcher, & Reubin, 1988). Feelings of guilt typically ensue if the family survivor believes the suicide could have been prevented (AAS, 2014). This guilt and strain associated with all these negative emotions often inhibit family member from
communicating, comforting, and supporting each other through the grieving process, further breaking down family cohesion (AAS, 2014).

**Economic Impact of Suicide**

The increasing suicide and attempted suicide rates have a monetary cost. Studies estimate that at least one million people in the U.S. each year intentionally inflict self-harm resulting in high healthcare system costs (CDC, 2002; Pitts, Niska, Xu, & Burt, 2008; SPRC, 2015). It has been projected that yearly, 494,169 people visit a hospital for injuries due to self-harm (CDC, 2002; Pitts, Niska, Xu, & Burt, 2008; SPRC, 2015). Unfortunately, the majority of suicide attempts are unreported or untreated (Crosby, Gfroerer, Han, Ortega, & Parks, 2011; SPRC, 2015). Therefore, current estimates most likely under-represent actual emotional and mental health costs incurred from the family and friend survivors of completed suicides and individual survivors of attempted suicides. Further complicating cost estimation is that the economic impact of suicide varies depending on the level of lethality, level of hospitalization (e.g. intensive care unit admission vs. floor patient admission, surgery vs. discharged from emergency department) and outcome of completed or attempted suicide. National statistics on attempted suicides are lacking due to the under-reporting of attempts and the absence of systematic surveillance (Crosby, Gfroerer, Han, Ortega, & Parks, 2011). Given the current suicide attempt estimates and suicide rates, attempted suicides cause an estimated $44 billion in medical and work loss costs in the U.S. in 2015 (AAS, 2014; CDC, 2002; Pitts, Niska, Xu, & Burt, 2008; SPRC, 2015). Typically, suicide attempts incur greater direct costs and result in a permanent disability requiring long-term care as compared to
completed suicide (Palmer, Halpern, & Hatzianandreu, 1995; CDC, 2002; Pitts, Niska, Xu, & Burt, 2008).

The economic costs of completed suicide have been addressed in previous studies (Corso, Phaedra S., et al, 2007; Palmer, Halpern, & Hatzianandreu, 1995; Shepard, Donald, et al; Yang, Bijou, & Lester, 2007). Unfortunately, most of these studies conflate the outcomes of attempted and completed suicides, and the methods used to estimate for indirect and projected costs vary. The last published results of the economic impact of completed suicide in the U.S. was in 1995 (Palmer, Halpern, & Hatzianandreu, 1995). At that time the combination of direct and indirect costs of a completed suicide was estimated to be $397,000 per suicide Palmer, Halpern, & Hatzianandreu, 1995). By calculation this amounts to an estimated $738,536.90 per suicide in 2016, adjusting solely for economic inflation (3% per year) and not for the additional inflation of health care costs. In addition to the impact of health care costs, 92% of suicides occur before the age of 75, resulting in considerable loss of talent and skill to the workforce, and U.S. taxable income (AAS, 2014; CDC, 2002; Pitts, Niska, Xu, & Burt, 2008; SPRC, 2015).

Future Directions

Reducing U.S. suicide rates is a national goal (U.S. Department of Health and Human Services [DHHS], 2015). Healthy People 2020 guides public health initiatives for the U.S. through the development of goals and objectives used as benchmarks for nationwide health improvement priorities (DHHS, 2015). The primary objective of the Healthy People 2020 mental health goal is to reduce U.S. suicide rates (DHHS, 2015). At the time the objective was written in 2007, the national suicide rate was 11.3 per 100,000
individuals, and the goal was to decrease the national suicide rate to 10.2 per 100,000 (a 10% improvement) (AAS, 2014; DHHS, 2015; McIntosh & Drapeau, 2014; SPRC, 2015). Since then, suicide rates have actually increased (11.3 to 13.26 deaths per 100,000 individuals from 2007-2015) (AAS, 2014; CDC, 2017; McIntosh & Drapeau, 2014; SPRC, 2015). Therefore, improving suicide surveillance, research and evaluation and prevention is now one of the four main strategic areas in the Surgeon General’s National Strategy for Suicide Prevention (DHHS, 2015).

To improve surveillance for suicide risk, more research that provides a better understanding of the complex range of determinants involving both individual and societal factors that contribute to suicide may be needed. Examples of some risk factors that are known to increase individual suicidality are exposure to violence as a child associated with suicidal behavior as an adult (Dube et al., 2001), and having a history of prior suicide attempt(s) (Tidemalm, Langstrom, Lichtenstein & Runeson 2008). Often, those who commit suicide had an underlying mental disorder that had not been adequately treated or yet identified (Bertolote & Fleischmann, 2002; Luoma, Martin & Pearson, 2002). Major depression has been found to be one of the strongest predictors of suicide (Luoma, Martin & Pearson, 2002); although, adding to the complexity, substance abuse and the symptoms of anxiety, panic attacks, desperation, hopelessness, feeling that one is a burden, loss of interest and pleasure, and delusional thinking combined with depression increase the risk of suicide even further (Luoma, Martin & Pearson, 2002). Evidence shows that although most mental disorders increase the risk for suicide, that major depression and substance use disorders are the most associated (Luoma, Martin, & Pearson, 2002; Tidemalm, Langstrom, Lichtenstein, & Runeson, 2008). Therefore, a
population with decreased mental health care and increased access to drugs and alcohol could be at an increased risk for suicide. However, although individual suicide risk factors have been well explored, the various social determinants of health such as housing burden, homelessness, lack of access to primary and mental health care, increased access to alcohol and illegal substances and their relationship to suicide risk have not.

Historically, suicide prevention efforts have been focused on secondary and tertiary prevention activities such as pharmacological interventions and psychotherapy for individuals already displaying signs and symptoms of the behavior (i.e. severe depression, suicidal thoughts and/or previous suicide attempts) (Knox, Conwell & Caine, 2004; CDC, 2011). Although therapy, mental health services and hospitalization are necessary means of suicide prevention for those exhibiting signs and symptoms of the behavior, more population-based approaches focusing on primary prevention and targeting a broader range of determinants beyond individual risk factors could have a greater effect on decreasing suicide rates (CDC, 2011). However, to create effective population-based or community-level suicide prevention programs, more research that encompasses the complex social relationships surrounding suicide is needed (Knox, Conwell & Caine, 2004; CDC, 2011).

To advance past the traditional focus of prevention and treatment of individual risk factors, current research exploring the social determinants of suicide could contribute more to suicide prevention than the past efforts (Knox, Conwell & Caine, 2004; CDC, 2011). Unfortunately, suicide is still often viewed and described as an individual issue; when it actually impacts families, communities, and society at large (CDC, 2011). To truly reduce the significant mortality burden, and negative emotional and societal effects
associated with suicide, the perspective of suicide needs to change from being an individual act to a population and public health problem. To adequately address this problem, more complex research exploring the social determinants of suicide is needed.

Population-level prevention efforts could provide a different approach to decreasing suicide rates in the United States. This approach could include surveillance to describe the problem, epidemiologic analysis to identify risk factors and the development and implementation of population-based interventions with specific outcome measures to assess the effectiveness of the program (Potter, Powell, & Kachur, 1995). One example of a current U.S. public health approach to suicide prevention is national funding for school-based suicide prevention programs that can be directed and evaluated with suicide risk data from the national Youth Behavioral Risk Factor Surveillance Survey (YBRFSS), which collects systematic state-based data yearly (Miller, Eckert, & Mazza, 2009). Implementing intervention programs with surveillance systems in place to measure the population-level behavioral health changes associated with the intervention helps to establish an evidence-base of effective intervention programs, as well as monitors the population-level impact of these programs. Perhaps similar strategies are needed for suicide prevention among U.S. adult populations.

The first step in implementing a public health approach to suicide prevention is the establishment of surveillance on suicidal behavior. Currently no U.S. surveillance systems systematically measures adult suicide risk (e.g. ideation, intent, previous attempts) behavior consistently over time at the local or county level. Although surveillance on suicide behavior exists at the state and national level since 2008 (Pitts, Niska, Xu, & Burt, 2008), the majority of population-based suicide prevention activities
occur in a community setting. Therefore, the population-level effectiveness of these intervention programs aimed to decrease suicide rates is difficult to evaluate. Further, suicide risk and outcomes have been identified as having geographical differences (Pitts, Niska, Xu, & Burt, 2008). Perhaps geographic differences that could be important to prevention activities are occurring at a more local level? In order to move forward with a strong national public health approach to suicide prevention, surveillance on adult suicidal behavior at the county and local level is needed.

The Behavioral Risk Factor Surveillance Survey (BRFSS) collects county generalizable data every three years to help inform local surveillance and prevention activities. Fortunately, suicide behavior questions have been incorporated at the county level in Monroe County, Florida. Therefore, we should take advantage of this unique opportunity and use the data to assess for population-based differences associated with suicide risk behavior at the local level. These findings could be used to inform local prevention activities, argue for policy change, guide the development of public health and mental health nursing interventions targeting population-based suicide prevention, and inform public health and mental health nursing curriculum.

As discussed in this chapter, U.S. suicides are problematic and negatively impact the economy, society and families. In addition to alleviating the negative emotional and mental health effects of survivor burden, a 10% decrease in suicide rates could result in an estimated $3,158,944,075 of direct and indirect cost savings for the U.S. If we want to decrease U.S. suicide rates, then perhaps more of a population-based approach to suicide prevention is needed.
The purpose of this dissertation is threefold. First, the differences between those who attempt suicide versus those who complete suicide will be explored through a concept analysis of suicide lethality to better understand the risk factors associated with completed suicide, and to inform nursing assessment, research and prevention activities. Second, the 2016 population-based prevalence of suicide risk in Monroe County will be estimated along with associated sociodemographic characteristics. Third, the association among mental illness, problem drinking, access to health care, socio-economic status, veteran status and suicide risk will be examined to assess population-based differences. Dissertation findings will inform community level public health prevention activities and public health nursing practices.
Chapter 2
Suicide Lethality: A Concept Analysis

Overview

Suicide is a significant public health problem (Brown, Henriques, Sosdjan, & Beck, 2004; Hawton & Van Heeringen, 2000; Sun, 2011). Families, communities and society in general are affected by the economic and human costs of suicide (McIntosh & Drapeau, 2014). The mortality burden combined with the negative emotional and mental health effects associated with survivors of suicide can be debilitating for families and communities (Cerel, Jordan & Duberstein, 2008).

There is a breadth of literature that examines suicidality (Hawton & Van Heeringen, 2000; Resnik & Hathorne, 1973). Overall, suicidality has been classified into three main outcomes that may also progress, for some, along a continuum of severity: suicide ideation, suicide attempts and completed suicides (Resnik & Hathorne, 1973). Although different suicidal outcomes and their relationship to each other has been clearly defined (Silverman et al., 2007), all suicidal behaviors remain grouped together within one broad category of suicidal behavior (Hawton & Van Heeringen, 2000; Silverman et al., 2007; Sun, 2011). Therefore, the behaviors associated with the different outcomes of suicide have not been clearly conceptualized.

Different suicidal outcomes may warrant different prevention strategies (Conner, 2004). For instance, different behaviors and risk factors have been identified in those who complete suicide as compared to those who attempt a non-fatal suicide (Hamdi, Amin, & Mattar, 1991; Hawton & Van Heeringen, 2000; Silverman et al., 2007; Sun, 2011). Thus, beyond identifying those at risk for suicide, it is additionally important for health care providers to identify those at risk for the different suicidal outcomes in order to implement the most effective prevention measures (Hamdi et al, 1991; Resnik &
Hathorne, 1973). Therefore, to inform health care provider’s suicide prevention efforts, the concept of “suicide lethality” will be analyzed to describe the phenomena comprised of the unique emotional state and behavior exhibited by individuals who complete suicide using the Walker and Avant (2010) method.

The purpose of this concept analysis is to establish suicide lethality as a phenomenon of interest to healthcare providers, in order to more accurately identify individuals ready to complete suicide and intervene appropriately. Although the term suicide lethality has been used in assessment scales and referenced in some health literature, it has not been defined as a distinct concept. Additionally, the origin of the concept of suicide lethality has not been clearly discussed. An exploration of the unique concept of suicide lethality could help health care providers to understand and recognize the differences within suicidal behavior that result in a completed suicide in contrast to an attempted suicide. Since the concept of suicide lethality has been embedded within the context of suicidal behavior, this paper will also differentiate between these two terms.

**Approach**

Walker and Avant’s (2010) concept analysis framework has been chosen for this analysis due to its successful usage by many authors to analyze concepts related to health care professional audiences (Halstead, De Santis, & Williams, 2016; Ridner, 2004; Sun, 2011; Walker & Avant, 2010). Walker and Avant’s (2010) framework is organized logically and stepwise. The framework consists of an eight step process which will be modified to six steps for this analysis: select a concept; determine the purpose of the analysis; identify all uses of the concept; determine the defining attributes; identify
antecedents and consequences; and define empirical referents (Halstead, De Santis, & Williams, 2016; Walker & Avant, 2010, p. 65).

A systematic search for articles published in the English language between 1970 and 2016 was performed using MEDLINE, the Cochrane Library, Pubmed, Psychlit, Ovid, PsychInfo and Proquest databases with the key words: “suicide” OR “attempted suicide” OR “completed suicide” OR “suicide risk factors” OR “predictors of suicide” to find articles that reported empirical results based on meta-analysis, reviews or literature, controlled trials, cohort studies, psychological autopsy studies, and case-control studies. The wide selection of years was chosen to capture the evolution of suicide theories and changes in the concept over time. The bibliographies of all included studies were also reviewed to identify additional relevant citations. In addition to this search, some books (Hawton & Van Heeringen, 2000; Resnik & Hathorne, 1973) on suicide were also included in the literature review. Analysis included comparing and contrasting the literature review data, identifying the concept uses, defining attributes, antecedents and consequences related to the concept of suicide lethality.

**Concept Uses**

**Suicide**

The term suicide can be used as both a verb and a noun (Merriam-Webster Online Dictionary, 2017). The first use of the word “suicide” was identified in 1645 and was believed to be derived from the word “sui,” meaning oneself, and “cidium,” meaning an act of killing (Merriam-Webster Online Dictionary, 2017). The verb suicide is defined as: “the act or an instance of taking one’s own life voluntarily and intentionally; the ruin

The use of suicide in the health literature is consistent with the dictionary definitions. Within the health literature suicide has been organized into three broad categories (completed suicide, attempted suicide and suicide ideation), all with separate definitions (Resnik & Hathorne, 1973). According to these authors (1973),

A completed suicide refers to a willful, self-inflicted, life threatening act which has resulted in death. A suicide attempt refers to a willful, self-inflicted, life threatening act resulting in physical injury but not in death. Suicide ideation includes ideations and acts that indicate a loss of desire to live but which have not yet resulted in physical injury (p. 7).

Each of these categories have subcategories indicating the individual’s intent and level of lethality of the suicide method (Resnik & Hathorne, 1973; Silverman et al., 2007).

**Lethality**

The term lethality is a verb and is derived from the root term lethal (Merriam-Webster Online Dictionary, 2017). The first use of the term “lethal” was circa 1604, and is believed to result from the Latin word “letum” meaning death (Merriam-Webster Online Dictionary, 2017). The Merriam-Webster Online Dictionary (2017) defines the noun lethality as “very potent or effective” and “relating to, or causing death.” Some synonyms for lethality are: baleful, deathly, fatal, fell, killer, deadly, mortal, murderous,

The use of lethality in the health literature is also consistent with the dictionary definitions (Card, 1974; Hamdi et al., 1991; Kar, Arun, Mohanty, & Bastia, 2014). According to Card (1974), “in the suicide literature the term lethality originally referred to the deadliness of various suicidal methods (p. 37).” Additionally, it has been defined as “the deadliness of the suicidal act or contemplated act” (Resnik & Hathorne, 1973, p.8). Card (1974) noted that the concept of lethality within the study of suicide began to expand to include an individual’s future risk of suicide. However, after being demonstrated to be measureable as two distinctly different constructs, the concept of the potential for future suicide by an individual was eventually fleshed out from lethality, and referred to as suicide risk (Card, 1974).

Lethality in suicide has also been defined as “the possibility or degree to which any biological change could have endangered the life of the suicide attempter” (Kar et al., 2014, p. 337). It is explained that high lethality in suicide “represents a lack of possible medical rescue due to the method that is chosen for suicide” (Resnik & Hathorne, 1973, p.8). Lethality in suicide has been explored as an indicator for the probability of a suicide attempt to cause death (or the intent of an individual to die) (Hamdi et al., 1991; Kar et al., 2014; Plutchik et al, 1989; Peterson, Peterson, O'Shanick & Swann, 1985). However, an individual’s intent to die in relation to the lethality of the chosen suicide method has been assessed in many studies and literature reviews with inconsistent correlations. The
inconsistent results of these different studies has left the subject of chosen lethality method in relation to suicidal intent controversial (Hamdi et al., 1991; Linehan, 1986; Peterson et al., 1985).

**Suicidal Behavior**

The term ‘suicidal behavior’ is not defined outside of the health literature. Within the health literature, suicidal behavior has been defined as “a self-inflicted, potentially injurious behavior for which there is evidence (either explicit or implicit) either that: (1) the person wished to use the appearance of intending to kill himself/herself in order to attain some other end; or (2) the person intended at some undetermined or known degree to kill himself/herself” (Silverman et al., 2007, p. 272). Suicidal behavior “includes completed suicide, nonfatal deliberate self-harm (e.g., suicide attempts, suicide gestures, parasuicide, self-injury, self-poisoning, self-harm) with or without suicidal intent, suicide communications, including suicide threats, and suicide ideation (Linehan, 1986, p. 16).” Conversely, the idea that individuals who complete suicide compared to those who attempt suicide represent separate populations with different risk behaviors was presented by suicide researchers in the 1950s (Stengel, Cook, and Kreeger, 1958). However, the concept of different suicidal behaviors among populations at risk for different suicidal outcomes was not perpetuated, although notable differences in behaviors related to the different outcomes continued to emerge in the literature (Linehan, 1986). Nevertheless, no attempt to conceptually differentiate the suicidal behaviors and risks associated with the different outcomes has occurred. Therefore, the concept of suicidal behavior continues to encompass all suicide outcomes.
Suicide Lethality

The term ‘suicidal lethality’ has not yet been defined outside the health literature. Beyond one publication describing suicide lethality as the lethality of the chosen suicide method (Wu, Su, & Chen, 2009), theorists Shneidman and Joiner conceptually identified suicide lethality “as a key ingredient of serious suicidality” (Joiner, 2007, p. 37; Shneidman, 1996, p. 133). For the purpose of this analysis, the concept of suicide lethality will be defined as “the acquired ability to enact lethal self-injury” (Joiner, 2007, p. 37). Within the suicide nomenclature, suicide lethality would hold a distinct classification, separate from a self-inflicted death with undetermined intent, or a self-inflicted unintentional death (Silverman et al., 2007). Within suicide lethality, the only intent of the individual is to perish as a result of the lethality of self-inflicted actions.

Defining Attributes

Defining attributes are the characteristics most frequently associated with the concept and that allow the analyst the broadest insight into the concept (Walker & Avant, 2010). When exploring the difference between attempted and completed suicide, several distinguishing factors surface. Within these differences, suicide lethality has four defining attributes: Caucasian men of advanced age; acute psychological distress; ineffective coping; and impulsivity.

Caucasian Men of Advanced Age

The combination of Caucasian race, advanced age, and male gender is an attribute of suicide lethality (Conner, 2004; Elnour & Harrison, 2008; Hamdi et al., 1991; Hall, Platt, & Hall, 1999; Linehan, 1986; Peterson et al., 1985). Advanced age has been found
to be a consistent predictor of completed suicide in many studies (Linehan, 1986; Peterson et al., 1985; Elnour & Harrison, 2008). In studies using attempted suicides via gunshot (a more lethal means) as a proxy for completed suicides, more lethal gun shots (i.e., to the head) were found in men of advanced age (Peterson et al., 1985). Furthermore, the majority of completed suicides throughout western countries are completed by Caucasian men (Hall et al., 1999; Linehan, 1986; Peterson et al., 1985). Hamdi et al., (1991) also found that advanced age correlated with higher suicide intent among those that completed suicide, possibly related to availability and knowledge of more lethal means such as firearms (Moore, Plew, Bray, & Snars, 1994; Joiner, 2007; Rhyne, Templer, Brown & Peters, 1995). Wu et al. (2009) found males used violent methods, and attempted a serious suicide more than women, particularly among Caucasian men of advanced age. In this study, males and the elderly, especially elderly Caucasian men were at greater risk for suicide completion (Wu et al., 2009).

**Psychological Distress**

To experience suicide lethality, an individual must be psychologically distressed. Psychological distress is defined as “the unique, discomforting, emotional state experienced by an individual in response to a specific stressor or demand that results in harm, either temporary or permanent, to the person (Ridner, 2004, p. 539). Some examples of underlying conditions that perpetuate psychological distress are adjustment disorders, mental illnesses and feelings of helplessness or hopelessness (Ridner, 2004).

Adjustment disorders have been found to be associated with the attribute of psychological distress and are strongly correlated with completed suicides (Moore et al., 1994; Simon, et al, 2002; Peterson et al., 1985; O'Donnell et al., 1996). An adjustment
disorder is a “distress occurring over a short period in response to adverse life circumstances, such as the break-up of a personal relationship” (Moore et al., 1994, p. 184). Adjustment disorders can arise from a variety of life stressors such as economic challenges, unemployment, death of a friend or family member, relationship difficulties, and/or chronic illness.

Mental illness is another contributing factor to the attribute of psychological distress in suicide lethality (Isometsä, 2001; Mann, et al., 2005; Yoshimasu et al, 2008). More than 90% of people who commit suicide have a Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) psychiatric illness (Mann, et al, 2005). While nearly all mental disorders have the potential to increase the risk for suicide, studies show that the most common disorders among people who complete suicide is major depression, schizophrenia and personality disorders (Dumais, et al, 2005; Yoshimasu et al., 2008). Among people who die by suicide, depression is more common than any other disorder (Dumais, et al, 2005; Hall et al., 1999; Hawton & Van Heeringen, 2000; Hawton, 2007; Linehan, 1986; Luoma et al., 2002; Peterson et al., 1985; Yoshimasu et al., 2008).

A lack of treatment of mental health disorders is associated with the attribute of psychological distress in suicide lethality. The majority of people who die by suicide had a mental disorder at the time of death (Bertolote & Fleischmann, 2002). Often, however, these disorders had not been recognized, diagnosed, or adequately treated (Bertolote & Fleischmann, 2002; Isometsä, 2001; Luoma et al., 2002). Help-seeking behaviors such as a visit to the primary care provider within one month of a suicide have been identified among individuals who complete suicide (Luoma et al., 2002; Mann, et al., 2005), as well
as reports of feeling helpless and hopeless (Hall et al., 1999). Additionally, the
symptoms of helplessness and hopelessness could possibly be exacerbated by the lack of
treatment of a mental disorder, compounding the psychological distress in individuals

**Ineffective Coping**

Ineffective coping, through acute substance abuse and other detrimental
behaviors, is an attribute for suicide lethality (Hawton, 2007; Hawton, & Van Heeringen,
2000; Jeon, Lee, Lee, Hong, Won, et al., 2010). Many use alcohol and/or drugs in the
previous 24 hours before the completed suicide (Peterson et al., 1985). A study
controlling for major depression as a risk factor for suicide in men found alcohol abuse
during the 6 months preceding death increased the likelihood of dying by suicide
(Dumais, et al, 2005). Recent onset of substance abuse, not necessarily chronic substance
abuse, was found in some studies to be the most useful predictor for completed suicide
(Hall et al., 1999; Mann, et al, 2005). Further, substance-related disorders are the
category of mental disorders most prevalent among completed suicides documented by
more than 20 major psychological autopsy projects (Yoshimasu, Kiyohara, & Miyashita,
2008). Among suicide studies other than psychological autopsies, the most prevalent
category of mental disorder among completed suicides is also substance abuse disorders
(Mann, et al., 2005; Isometsä, 2001; Yoshimasu et al., 2008).

In addition to substance abuse, the symptoms of anxiety, panic attacks,
desperation, hopelessness, feeling that one is a burden, loss of interest and pleasure
(anhedonia), and delusional thinking, have been correlated with completed suicides, as
are all other signs and symptoms of ineffective coping (Luoma, Martin & Pearson, 2002).
Beyond ineffective coping, acute substance abuse prior to a completed suicide has also been associated with impulsive suicide attempts (Kendall, 1983; Simon et al., 2002).

**Attempt Impulsivity**

Attempt impulsivity is another attribute of suicide lethality, and probably the most controversial (Rimkeviciene & De Leo, 2015). Impulsive attempts have been defined by the absence of planning, the duration of the suicidal process, or by self-report of a stated impulsive attempt by the attempter (Anestis, et al., 2014; Deisenhammer et al., 2009; Gore-Jones & O’Callaghan, 2012; O’Donnel et al., 1996). In the past, impulsive suicide attempts were viewed casually, but recently suicide lethality has emerged consistently with this behavior (Hall et al., 1999; Hawton, 2007; Hawton & Van Heeringen, 2000; O'Donnell, Farmer, & Catal, 1996; Peterson et al., 1985). For example, many individuals who completed suicide only had symptoms that developed within the 3 months preceding the suicide (Hall et al., 1999). Also, a study exploring the duration of the suicidal process (time from the decision to the act) among proxies for lethal suicide found the time between the decision to suicide and the act was about 10 minutes in over half of the participants (Deisenhammer, Strauss, Kemmler, Hinterhuber & Weiss, 2009).

Presence of a suicide plan or a written suicide note was not found to be associated with completed suicide (Misson, 2010; Peterson et al., 1985; Hall et al., 1999). It has been found that many will communicate the intent to attempt suicide, although extremely few leave a written note (Simon et al., 2002). Those who do communicate intent do so when the chance of rescue prior to the act is not possible (Misson, 2010; Simon et al., 2002). Most completed suicides quickly secure a location that is less discoverable and
have a greater expectation of death without communicating intent to suicide to others in the moments before the act (Misson, 2010; Simon et al., 2002).

Use of a violent method (firearms, jumping or hanging) is associated with impulsive suicide attempts (Elnour & Harrison, 2008; Misson, 2010; Simon et al., 2002). Kar et al. (2014) found that a more violent lethal means was used among those trying to remain undiscoverable with a strong intent to die. Finally, impulsive attempts were associated with more lethal and violent methods, compared to planned attempts that did not lead to completed suicide (Kar et al., 2014; Misson, 2010).

**Antecedents**

Antecedents are events, incidents or conditions that must precede the occurrence of the concept (Walker & Avant, 2010). Suicide lethality has three defining antecedents: acute interpersonal conflict, intent to die, and access to lethal means.

**Acute Interpersonal Conflict**

The occurrence of an acute interpersonal conflict is an antecedent to suicide lethality. Although some suicides occur out of an accumulation of stressors, both internal and external, usually a single event, such as a major loss, triggers a completed suicide (Bagge, Littlefield, & Lee, 2013; Moore et al, 1994). Many studies exploring completed suicides found that the majority had experienced an interpersonal conflict in the 24 hours before the incident (Bagge, Littlefield, & Lee, 2013; Peterson et al., 1985; Hall et al., 1999). These interpersonal conflicts took on various forms such as an argument with a spouse, lover or family member, or other stressors such as financial, business failures, or involuntary termination of employment (Hall et al., 1999; Moore et al., 1994).
Intent to Die

Having a clear intent to die by self-inflicted actions is an antecedent to suicide lethality. Studies support the antecedent of intent to die as being associated with individuals choosing the most lethal means for the suicide method and committing the act in an isolated area (Biddle et al., 2010; Kar et al., 2014; Rhyne, Templer, Brown & Peters, 1995). Psychological autopsy studies have also shown that about one-third of people who completed suicide did not communicate the suicide intent to others (Yoshimasu et al., 2008), implying that these individuals had no intent of wanted rescue (Bertolote & Fleischmann, 2002). The intent to die has been associated with higher measures of lethality in suicide (Kar et al., 2014).

Access to Lethal Means

Access to lethal means is an antecedent to suicide lethality (Mann et al., 2005). Biddle et al (2010) in a qualitative study of individuals who had survived a near fatal suicide attempt found that the ease of access and use of lethal means, and the subsequent probability of death occurring by those lethal means, were the most frequent choices of those intending to die through suicide. Hawton (2007, p.4) states, “at the point at which a person feels hopeless and potentially suicidal, access to specific methods for suicidal behavior can be crucial. Indeed, this may be the key factor that influences translation of suicidal thoughts into an actual suicidal act.” It has also been noted that the choice of lethal means is usually related to the access of lethal means (Hawton, 2007; Hawton & Van Heeringen, 2000; Rhyne, Templer, Brown & Peters, 1995). However, an
individual’s accurate expectations of the lethality of the means is also an important factor of whether the suicide will be completed (Rhyne, Templer, Brown & Peters, 1995; Wu et al., 2009).

Consequences

Walker and Avant (2010, p. 73) define consequences in a concept analysis as the “outcomes of the concept.” Suicide is a serious public health problem that has economic and human cost that affects families, communities and society in general (Centers for Disease Control and Prevention [CDC], 2011; Resnik & Hathorne, 1973). The ultimate consequence of suicide lethality is death of the individual. Societal consequences consist of family grief, such as shame, guilt, self-blame, and shock, community grief and economic loss, such as cost to the health care system and loss to society (i.e. skills and income) (CDC, 2011; Knox, Conwell & Caine, 2004; Resnik & Hathorne, 1973).

The economic costs of completed suicide have been addressed in many studies (Corso, Phaedra, et al., 2007; Palmer, Halpern, & Hatzianandreu, 1995). Unfortunately, indirect costs and projected costs of attempted and completed suicides are conflated in most of these studies. The last published results of the economic impact of completed suicide in the U.S. was in 1995 (Palmer, Halpern, & Hatzianandreu, 1995). At that time the combination of direct and indirect costs of a completed U.S. suicide was estimated to be $397,000 per suicide (Palmer, Halpern, & Hatzianandreu, 1995). This amounts to an estimated $738,536.90 per suicide in 2016, adjusting solely for economic inflation (3% per year) and not for the additional inflation of health care costs. In addition to the impact of health care costs, 92% of suicides occur before the age of 75, resulting in
considerable economic loss of talent and skill to the workforce, and U.S. taxable income (American Association of Suicidology, 2014; SAMHSA, 2015). Beyond the direct medical and indirect economic costs of loss of income, completed suicides further result in societal costs and have a direct impact on the family of survivors.

Societal exposure to suicide can occur through the media, or the direct loss of a friend, colleague or family member. It is projected that 6.3 million people are exposed to suicide annually in the U.S (American Association of Suicidology, 2014). An estimated 12% of those exposed experience a major life disruption (American Association of Suicidology, 2014; Cerel, 2015; Cerel, et al., 2014; Cerel, Jordan, & Duberstein, 2008). An example of serious life disruptions is increased suicidal behavior among those exposed to suicide through mass media (Jordan, 2008; Resnik & Hathorne, 1973).

Annually, millions of people are bereaved through suicide (American Association of Suicidology, 2014; Cerel, et al., 2014; Cerel, Jordan, & Duberstein, 2008) Individuals who experience a direct loss from suicide, such as the loss of a family member, friend or colleague, are referred to as suicide survivors (Cerel, 2014). If a suicide occurs every 12.3 minutes in the U.S., then there is also a projected 18 new suicide survivors every 12.3 minutes (Cerel, 2014). It was estimated in 2014 that 1 out of every 21 Americans was a suicide survivor (Cerel, 2014).

Family grief, guilt, straining and sometimes breakdown of family cohesion are consequences of suicide for survivors (CDC, 2011; Jordan, 2008) Family survivors frequently struggle with understanding why the suicide occurred and whether family members could have helped to prevent the suicide (American Association of Suicidology, 2014). Survivors are left with grief and confusion while attempting to move forward past
the devastating incident (Cerel, et al., 2014; Cerel, Jordan, & Duberstein, 2008; Pompili, Maurizio, et al. 2013). Emotional pain and remorse at the loss of life of the person committing suicide often results in anger among survivors (Hawton & Van Heeringen, 2000). Alternatively, some family members may perceive a sense of contribution to the suicide, and often take blame for not preventing the suicide (American Association of Suicidology, 2014; Brent, Moritz, Bridge, Perper, & Canobbio, 1996). For example, women whose husbands had died by suicide experienced more self-guilt and self-blame than widows who lost a husband from an accident (McNiel, Hatcher & Reubin, 1988). Feelings of guilt typically ensue if the family survivor believes the suicide could have been prevented (American Association of Suicidology, 2014). This guilt and strain associated with these negative emotions often inhibit family member communication, comfort, and support through the grieving process, further breaking down family cohesion (American Association of Suicidology, 2014)

**Empirical Referents**

Walker and Avant (2010, p. 73) defines empirical referents as “classes or categories of actual phenomena that by their existence or presence demonstrate the occurrence of the concept itself.” It is also explained that empirical referents are used to enable the measurement of the concept (Walker & Avant, 2010).

Several scales have been developed that measure the lethality of suicide attempts (Kar, et al, 2014; Plutchik, Van Praag, Picard, Conte, & Korn, 1989; Potter, et al., 1998; Sun, 2011; Smith, Conroy, & Ehler, 1984; Weisman & Worden, 1972), but none that attempt to measure the concept of suicide lethality as described in this analysis. Most of
these scales measure the individual’s choice of lethal means and the chance of rescue 
(Plutchik, Van Praag, Picard, Conte, & Korn, 1989, Potter, et al., 1998, Smith, Conroy, & 
Ehler, 1984; Weisman & Worden, 1972. For example, lethality assessments have been 
defined as the “focus on the actual lethality of the method used and the circumstances 
surrounding the attempt” (Kar et al., 2014, p.337). The lethality of a suicide was 
originally measured by Weisman and Worden (1972) by a risk/rescue index. Risk was 
defined as the actual damages that occurred by the method used, and rescue was the 
probability of discovery. Since then, additional measurement tools have been developed 
that further incorporate the measurement of suicidal intent, such as Beck’s Suicidal Intent 
Scale (Beck et al., 1974). Within this scale, intent is defined as a “balance between the 
strength of the wish to die and the wish to live” (Beck et al., 1974).

Unfortunately, the underlying assumption behind many of these scales is that 
suicidal intent is reflected in the chosen method for suicide. However, correlations 
between suicidal intent and the lethality of the suicide method varies among studies 
(Conner, 2004; Hawton, 2007; Harriss, Hawton & Zahl, 2005). Further, several studies 
have demonstrated that an individual’s reasoning behind the chosen method for suicide 
moves beyond lethality and includes other factors such as accessibility, knowledge, 
duration and expected agony of the chosen means (Misson et al., 2010; O'Donnell et al., 
1996; Peterson et al., 1985; Rhyne, Templer, Brown, & Peters, 1995; Wyder & De Leo, 
2007). Therefore, measures evaluating an individual’s level of psychological distress may 
be more appropriate in measuring suicide lethality. The level of psychological distress 
may be measured by the presence of an adjustment disorder due to a recent interpersonal 
conflict, untreated mental illness, isolation, or ineffective coping that may be manifested
through acute substance abuse, acute anxiety and/or depression, expressed feelings of hopelessness or helplessness, and anhedonia. This comprehensive assessment of a client at risk for suicide might be more helpful in assessing an individual’s risk for suicide lethality as described in this analysis.

**Implications**

This concept analysis has differentiated between suicide, lethality, suicidal behavior, and suicide lethality. The presentation of attributes related to the concept, along with antecedents and consequences should enable health care providers to identify suicide lethality when present in individuals and intervene appropriately. A visual depiction of the concept of suicide lethality is depicted in Figure 1.

Figure 2.1. Antecedents, attributes and consequences of the concept of suicide lethality.
This concept analysis of suicide lethality provides implications for practice, research, and policy. Clarifying the concept of suicide lethality encourages awareness of the possibility of different suicidal behaviors associated with different suicidal outcomes and informs the development of client-centered interventions. For instance, those with suicide lethality often choose to suicide quickly in response to an acute interpersonal conflict, rarely communicate the plan, have access to lethal means, do not contemplate the decision for long before acting, and often attempt to see a healthcare provider in the recent months before the act. When comparing these attributes of suicide completers to those of suicide attempters, attempters often communicate their plan, may or may not have access to very lethal means, and consider the act of suicide for a longer amount of time before attempting the act (Bertolote & Fleischmann, 2002; Luoma, Martin, & Pearson, 2002).

Although there are overlapping symptoms between suicide completers and suicide attempters such as anxiety, desperation, hopelessness, feeling that one is a burden, and loss of interest and pleasure (anhedonia), individuals with the behavior associated with suicide lethality compound these symptoms with acute substance abuse, or the presence of an untreated mental illness. Additionally, these symptoms are intensified or triggered by an acute interpersonal conflict that leads to psychological distress among individuals with ineffective coping mechanisms (Joiner, 2007, p. 41). Nurses providing care to those at risk for suicide need awareness of these conflicts, and must have the ability to intervene in a timely fashion in order to prevent suicide among vulnerable clients.

The presence of a suicide plan or a written suicide note was found to be more associated with attempted rather than completed suicides, feasibly this could be due to the
impulsivity of the decision for suicide lethality. Although the role of attempt impulsivity in suicide remains debatable (Bender, Gordon, Bresin, & Joiner, 2011; Klonsky & May, 2010; Smith et al., 2008), research has demonstrated that planned rather than impulsive suicide is associated higher degrees of lethality (Baca-Garcia 2001, Baca-Garcia 2005, Conner 2004, Mann et al., 1992; Simon et al., 2002). Controversially, many of these studies assessing attempt impulsivity studied populations of individuals who attempted suicide using a highly lethal method, such as jumping from a lethal height, jumping in front of trains, hanging, and shotgun blasts to the head or abdomen (Gore-Jones & O’Callaghan, 2012; Mitriv, 1995; O’Donnel, 1996; Simon et al., 2002). Within these studies, although the chosen means for the attempt was highly lethal, attempters who made an impulsive attempt were less likely to think the attempt would be fatal. Perhaps the priority in assessing the lethality of the method in attempt impulsivity is assessing the extent that the individual was knowledgeable of the level of lethality of the method (Zhang & Xu, 2007). For example, Caucasian men of advanced age are more likely to complete suicide than Caucasian women who are more likely to attempt (Conner, 2004). Conceivably this difference could be due to the tendency of Caucasian men to have more knowledge, experience and access to lethal methods, such as guns, rather than the length of time spent engaged in suicide planning (Conner, 2004). Further clarification of the phenomena of attempt impulsivity and its association with suicide lethality could help inform future nursing suicide knowledge.

The findings from this concept analysis provide the foundation for future research. Scales measuring the concept of suicide lethality by the signs and symptoms associated with the concept’s attributes are needed to help healthcare providers identify
an individual at risk for completed suicide. For instance, scales need to be developed that assess for acute substance abuse among individuals with an acute interpersonal conflict. This scale or instrument must also include feelings of hopelessness, helplessness, and/or anhedonia, which might help in the identification of those at high risk for suicide lethality. Nursing suicide assessments may be more informed by questions assessing acute interpersonal conflict coupled with ineffective coping, and to what degree those individual have access to lethal means. Translating these findings into the development of preventative nursing screening interventions could help reduce the incidence of suicide.

In terms of policy, this concept analysis provides some implications. Mental health improvement is a goal that was established by the U.S. government in 2010. More specifically, the Healthy People 2020 publication by the U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion (2010) developed objectives that aim to decrease the suicide rate by increasing treatment expansion for mental health services. This includes increasing the number of mental health treatment facilities, increasing the number of adolescent and adults who receive these services (especially those with co-occurring mental health and substance abuse disorders), and increasing screening for depression in primary care settings. In order to achieve these goals, nurses interested in policy development must work to reduce mental health associated stigma, and advocate for increased funding to address the mental health needs of the U.S. Nurses must continue to work to ensure that adequate mental health content is included in both undergraduate and graduate nursing programs. This increased mental health content will ensure that all levels of graduates from nursing programs are equipped with knowledge and skills to address the mental health needs of vulnerable populations.
Suicide is a significant public health problem. There are different behaviors and risk factors among those that attempt suicide, and those that are successful in the attempt. The purpose of this concept analysis was to provide a clearer definition of the concept of suicide lethality. This concept analysis has provided some implications for practice, research, policy development and prevention activities related to the concept of suicide lethality. Clearly more work in terms of practice, research, and policy is needed to address this significant health problem among vulnerable populations. The next chapter of this dissertation will discuss the theory and method for exploring Monroe County’s population-based data on suicide behavior.
Chapter 3
Theoretical Framework, Dissertation Aims and Analysis
Methods
**Overview**

The purpose of this chapter is to describe the dissertation theoretical framework, study aims, research questions, study variables, and methods of analysis. Analyses described here were conducted using adult resident data from the 2016 Monroe County Florida Behavioral Risk Factor Surveillance Survey (BRFSS). The BRFSS is a state-based surveillance system operated by the Centers for Disease Control and Prevention (CDC) that collects county generalizable data every three years (CDC, 2013).

**Theoretical Framework**

The theoretical framework for this dissertation is an adaptation of the Commission on Social Determinants of Health (CSDH) Conceptual Model (WHO, 2010). This model, similar to other variations of the Determinants of Health Model asserts that different social conditions shape health inequalities, and that these health inequalities lead to worsening disease states (WHO, 2010). The theoretical beginnings of this model are grounded in Great Britain’s Black report on inequalities in health (Black, Morris, Smith, & Townsend, 1980; Marmot, Rose, Shipley, & Hamilton, 1978). Black (1980) argued that reducing health inequalities between different economic groups, or social classes, required interventions that reached beyond the current clinical care of biologically based physical and mental health, and instead required interventions that addressed different social sectors that contribute to health, such as education, housing, work and social welfare. Black referred to the biological, and different social aspects of health, as determinants (Black, Morris, Smith, & Townsend, 1980). Determinants of health research has grown since the 1980s, with researchers exploring how various social,
environmental, biological, physical and psychosocial determinants contribute to health (Braveman, Egerter, & Williams, 2011; Campbell, Marsden & Hurlbert, 1986; Kawachi & Kennedy, 1997; Mackenbach & Howden-Chapman, 2003; Mirowsky & Ross, 1998).

Social inequalities can create health inequalities that can lead to worsening disease states or injury outcomes, such as suicide (Black, Morris, Smith, & Townsend, 1980; Marmot, Rose, Shipley, & Hamilton, 1978). Suicide risk is known to be influenced by different physical and psychosocial determinants, such as mental illness, and chronic and/or debilitating diseases (Russell, Turner, & Joiner, 2009; Yoshimasu, Kiyohara, & Miyashita, 2008). The social determinants that contribute to health inequalities may also contribute to suicide risk. These associations could be better understood by using the Determinants of Health Model to understand suicide risk in population-based data (Dasgupta, Beletsky, & Ciccarone, 2018).

Currently, several variations of the Determinants of Health model exist in research and practice (Braveman, Egerter, & Williams, 2011; Diez Roux & Mair, 2010; Stringhini, et al, 2010). Different studies have utilized various models and statistical approaches to examine the associations between determinants of health and disease (Braveman, Egerter, & Williams, 2011; Cohen, 2004; Demakakos, Nazroo, Breeze, & Marmot, 2008; Diez Roux & Mair, 2010; Lahelma, Martikainen, Laaksonen, & Aittomäki, 2004; Mickelson & Kubzansky, 2003; Stringhini, et al, 2010). However, none have used this model to understand the phenomenon of suicide risk.
Figure 3.1. Adaptation of the Social Determinants of Health Model (WHO, 2010).

The adaptation of the Social Determinants of Health Model is depicted in Figure 3.1. This model clarifies how SES contributes to suicide risk, depending on the amount of wealth and social status achieved by an individual (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010). The model depicts how different structural determinants of SES such as education, employment, and income, contribute to wealth, and how wealth leads to behavioral, biological, and psychosocial intermediary determinants that could contribute to suicide risk (WHO, 2010). The adaptation of this model to assess suicide risk is supported by Durkheim’s Theory of Social Integration (Durkheim, Simpson, & Spaulding, 1952), which explains how different social inequalities contribute to suicide. Durkheim’s theory supports that measures of the structural determinants of SES could be important predictors of the behavioral, biological and psychosocial intermediary
determinants, such as physical illness, disability, or mental illness, which contribute to suicide risk (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010).

The CSDH model differs from other Social Determinants of Health models in two important ways. First, the socio-economic-political context is incorporated into the conceptual framework (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; WHO, 2010) (WHO, 2010). The Monroe County socio-economic-political context, although unable to be measured by the individual level data captured in the BRFSS data set used in this study, is important to consider from the perspective of this study’s findings. For instance, the Monroe County social context of high costs of living and lack of affordable housing could be contributing to wealth disparities among the Monroe County residents. Second, the CSDH model explains the hierarchical progression of how different structural determinants (education, income, occupation) contribute to an individual’s socioeconomic status that is driven by wealth accumulation (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; WHO, 2010). The conceptual progression of how these structural determinants lead to wealth and health from the perspective of suicide risk is described next.

**Socioeconomic Structural Determinants**

The socioeconomic structural social determinant in this model consists of education, occupation, income and wealth. As will be discussed later, race, ethnicity and gender are depicted in the model as moderators of these other structural determinants. *Education* qualifies an individual for *employment* through
occupation, which then leads to *income* and in turn results in *wealth* (Braveman, Egerter, & Williams, 2011; Kessler, Borges, & Walters, 1999; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010). Education, employment and income have been associated with suicide inconsistently, with lower levels of education, unemployment and low income contributing to higher rates of suicide in some studies, and higher levels of education, employment, and higher income associated with suicide in other studies (Cubbin, LeClere, & Smith, 2000; Kessler, Borges, & Walters, 1999; Milner, Niven, & LaMontagne, 2015). One possibility for the inconsistent findings is that these structural determinants are not a consistent measure of wealth. Instead, as per the CSDH model guiding this study, the combined influence of education, employment and income contribute to wealth. Additionally, differences in the unmeasured socioeconomic and political context that exists across conflicting studies may also contribute to these inconsistencies.

A better measure of SES could be the outcome of the different levels of education, employment and income that reflect an individual’s wealth (WHO, 2010). Wealth equates to an individual’s SES, as well purchasing power to obtain material resources, such as home ownership. *Housing tenure*, the status of owning or renting your home, was used as a measure of wealth in this study. The use of housing tenure as a measure of wealth is consistent with other studies investigating the association of SES and suicide that found wealth, as measured by material assets, to be the SES measure most associated with suicide (Braveman, Egerter, & Williams, 2011; Lewis & Sloggett, 1998; Lorant, Kunst,

Social class and wealth are reflections of social status and power (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010). The effect of social status and power on suicide risk is explained by Durkheim’s Theory of Social Integration, which postulates that lower levels of social status lead to less social integration and fewer opportunities, resulting in an increased risk for suicide (Duberstein, Conwell, Conner, Eberly, Evinger, & Caine, 2004; Durkheim, Simpson, & Spaulding, 1952; Kessler, Borges, & Walters, 1999; Portes, 2000). Therefore, it is important to assess the association of these socioeconomic structural determinants that comprise an individual’s SES with suicide risk in Monroe County.

Race and ethnicity refers to a social structural determinant of suicide risk that represents the social culture and heritage that individuals share (Krieger, 2002; Oquendo, Ellis, Greenwald, Malone, Weissman, & Mann, 2001; WHO, 2002; WHO, 2010). Suicide risk is more associated with the White race in the U.S., as they experience higher rates of suicide when compared to African Americans and Hispanics (Chang, 1998; Kessler, Borges, & Walters, 1999). However, in addition to differences in suicide rates between race and ethnic groups, suicide rates are also different for men as compared to women (Chang, 1998; Cubbin, LeClere, & Smith, 2000; Kessler, Borges, & Walters, 1999; Law, Snider, & De Leo, 2014; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005).
Gender is a socially constructed characteristic (Krieger, 2002; WHO, 2002; WHO, 2010). The social constructions of race, ethnicity and gender form foundations of stigma, division and discrimination. Stigma and discrimination could possibly interact with SES to contribute to increased suicide risk in many social contexts, including Monroe County. Therefore race, ethnicity and gender were assessed as moderating factors of SES and suicide risk in this study (Krieger, 2002; Krieger, 2005; WHO, 2002; WHO, 2010).

**Socioeconomic Intermediary Determinants of Suicide Risk**

The socioeconomic intermediary determinants of health result from socioeconomic structural determinants that contribute to an individual’s status and hierarchy within society, as moderated by health system access (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010). Different social hierarchies, as moderated by health care system access, can lead to different exposures and health-compromising vulnerabilities (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010). Compromised health leads to illness, which then in return, feeds back upon the individual’s social hierarchy by reducing income, employment opportunities and wealth which establishes an individual’s level of social class (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010).

Several behavioral, psychosocial and biological intermediary determinants of health status have been associated with suicide risk. Examples of the psychosocial determinants associated with suicide risk are mental illness, such as
depression, bipolar disorder and anxiety, and unmanaged mental health conditions (Bertolote & Fleischmann, 2002; Kim, 2016; Luoma, Martin & Pearson, 2002). Subsequently, worsening psychosocial disorders can lead to behavioral determinants that are also associated with an increased risk for suicide, such as lack of exercise or substance use (Luoma, Martin, & Pearson, 2002; Tidemalm, Langstrom, Lichtenstein, & Runeson, 2008). Worsening health conditions and activity limitations caused by physical illness are biological determinants that have also been associated with increased suicide risk in the literature (Kim, 2016; Khatoon, Khalid, Fatima, & Minhas, 2015).

Study Aims and Research Questions

AIM 1: To estimate the 2016 prevalence of adult suicide risk in Monroe County and associated sociodemographic characteristics, and socioeconomic structural and intermediary determinants.

Research Question 1: What is the estimated prevalence of suicide risk among Monroe County adult residents in 2016?

Research Question 2: What are the sociodemographic characteristics, and socioeconomic structural and intermediary determinants of Monroe County adult residents at risk for suicide in 2016?

AIM 2: To examine the associations among sociodemographic characteristics, and socioeconomic structural and intermediary determinants and suicide risk among 2016 Monroe County, Florida adult residents.
Research Question 1: Will sociodemographic characteristics, and socioeconomic structural and intermediary determinants be associated with an increased risk for adult suicide in 2016 Monroe County, Florida residents?

AIM 3: To examine the interaction of socioeconomic structural determinants with access to health care, with race and ethnicity, and with gender on suicide risk among Monroe County, Florida adults.

Research Question 1: Will significant correlates of socioeconomic structural determinants of suicide risk interact with access barriers to health care to increase suicide risk among adult 2016 Monroe County, Florida residents?

Research Question 2: Will significant correlates of socioeconomic structural determinants of suicide risk interact with race and ethnicity to increase suicide risk among adult 2016 Monroe County, Florida residents?

Research Question 3: Will significant correlates of socioeconomic structural determinants of suicide risk interact with gender to increase suicide risk among adult 2016 Monroe County, Florida residents?

Aim 4: To examine associations among sociodemographic characteristics and suicide risk question nonresponse among 2016 adult Monroe County, Florida residents.

Research Question 1: What are the sociodemographic characteristics of Monroe County adult residents that did not respond to the suicide risk questions in 2016?

Research Question 2: Will significant sociodemographic characteristics of suicide risk question nonresponse be associated with an increased odds of not answering the suicide risk questions among 2016 Monroe County, Florida adult residents?
Data Set

Data for this study originated from the BRFSS, the world's largest ongoing, state-based surveillance system operated by state health departments in collaboration with the Centers for Disease Control and Prevention (CDC) (CDC, 2013). BRFSS is one of the United States’ primary sources of health information on disease conditions, health behaviors, and health services use and access. The data are used to set health goals and monitor public health progress at national, state, and local levels. BRFSS collects county-level generalizable data once every three years. The sample size collected from the Monroe County, FL population was 535 respondents. Seven respondents were less than 18 years of age and therefore removed from the data set for a final sample of 528 respondents.

BRFSS uses a multistage sampling design to collect uniform, generalizable, county-specific data every three years from the noninstitutionalized U.S. civilian population 18 years of age or older (CDC, 2013). Trained interviewers, using a computer-assisted random-digit dialing telephone interviewing (CATI) system, collect data from a standardized questionnaire throughout the year on a monthly basis of the US adult population with landline telephones and cell phones (CDC, 2013; Florida Department of Health, 2016). Responses were weighted according to the respondent's probability of selection and the age, sex, and race/ethnicity-specific distribution of the population using post-census projections for each state and territory (CDC, 2013; CDC, 2017). BRFSS uses a complex, non-probability based sampling method that includes stratification and
cluster sampling. Detailed weighting and analytic methodologies have been previously published (CDC, 2017; Florida Department of Health, 2016; Pierannunzi, Hu, & Balluz, 2013).

**Effect size and Power**

The effect size estimates the strength or weakness of the relationship between and independent and dependent variable (Polit-O'Hara & Beck, 2006, p. 422). Effect sizes range from small to large (Polit-O'Hara & Beck, 2006, p. 424), and the exact estimate for an effect size depends on the type of analysis used (Polit-O'Hara & Beck, 2006, p. 425).

A meta-analysis exists summarizing effect sizes for associations between depressive disorders and suicide risk ($OR = 13.42$) (Yoshimasu, Kiyohara, & Miyashita, 2008), but no similar meta-analysis exists for associations involving other determinants of suicide. Power ($1 – \beta$), which is the ability of statistical test to detect a true relationship or difference (Polit-O'Hara & Beck, 2006), was assumed to be .80 to reduce the risk of a type II error for all study analyses. Alpha ($\alpha$) was $\leq .05$ to reduce the risk of a Type I error. These values are also the standard used in nursing research (Polit-O'Hara & Beck, 2006). A power analysis was conducted using the PASS sample size calculator for specific aims one through three. This study was found to have enough power to detect an odds ratio of 2.9 and above.

**Study Variables**

The BRFSS questionnaire consists of three parts: (1) core questions asked in all 50 states, the District of Columbia, Puerto Rico, Guam, and the US Virgin Islands; (2) supplemental modules, which are a series of questions on specific topics (i.e. adult
asthma history, intimate partner violence, mental health) that a state can choose to include in the state-specific survey; and (3) questions added by the states individually. Core and county added questions were used in this study. Details of the validity and reliability of the BRFSS survey methodology have been previously published (CDC, 2006). Figure 3.2 depicts the BRFSS variables assessed in this study in association with the conceptual model that guided the analysis.

Figure 3.2. BRFSS variables associated with the adapted conceptual model.

**Suicide Risk**

Lifetime suicide risk was assessed using the revised Suicidal Behaviors Questionnaire (SBQ-R) items 1, 3 and 4 (Appendix B). SBQ-R Item 2 was not able to be used due to a survey administration error. For the SBQ-R Item 1, a cutoff score of two
was used for suicide risk in this study. A score of two for SBQ-R item one produced the best sensitivity and specificity when compared to the Beck Hopelessness Scale (sensitivity: 100%; specificity: 96%) (Osman et al., 2001). Additionally, if respondents reported having ever told someone they would attempt suicide (Item 3, responses 2-5), or reported thinking they would die by suicide one day (Item 4, responses 5-7), those respondents were also considered at risk for suicide. Responses of “don’t know/not sure” (7) and “refused” (9) were treated as missing data. The resulting suicide risk variable was dichotomized as yes (1) and no (0).

**Suicide Risk Question Response and Nonresponse**

Suicide risk question response was defined as responding to at least one of the three SBQ-R items. Nonresponse was defined as SBQ-R question responses of “don’t know” and “refused” across all three items, item nonresponse across all three items, or a combination of both. The resulting dichotomous variable, suicide question nonresponse and response, classified respondents as either missing (nonresponse [1]), or non-missing (response [0]).

**Sociodemographic Characteristics**

Two BRFSS variables of age and marital status were used to assess sociodemographic characteristics (Appendix C). Age was assessed using a continuous variable with two additional responses of don’t know/Not sure (07) and refused (09) which were treated as missing data. For this study, age categories were dichotomized into 18–44 years of age (0), and 45 years of age and greater (1). Marital status was assessed using the following response options (Appendix C): married (1); divorced (2); widowed (3); separated (4); never married (5); a member of an unmarried couple (6); or refused
(9). For this study, responses were combined to create a 3 category variable: married/couple (1 [1, 6]), single (2 [2, 4, 5]), and widowed (3 [3]). Responses of “don’t know/not sure” (77) and “refused” (99) were treated as missing data.

**Socioeconomic Structural Determinants of Suicide Risk**

BRFSS gender, race/ethnicity, education, employment, income, and housing tenure questions were used to assess the socioeconomic structural determinants of suicide risk. The BRFSS question for gender has three response options: male (1), female (2), and refused (9) (Appendix C). For this study, gender was recoded to male (0) and female (1). Responses of “don’t know/not sure” (7) and “refused” (9) were treated as missing data.

BRFSS contained one ethnicity question (Appendix C). The possible response options for the BRFSS ethnicity question were: Mexican, Mexican American, Chicano/a (1); Puerto Rican (2); Cuban (3); another Hispanic, Latino/a, or Spanish origin (4); no (5); don’t know/not sure (7); and refused (9). BRFSS assessed race using the following response options (Appendix C): White (10); Black or African American (20); American Indian or Alaska Native (30); Asian (40); Asian Indian (41); Chinese (42); Filipino (43); Japanese (44); Korean (45); Vietnamese (46); other Asian 47); Pacific Islander (50); Native Hawaiian (51); Guamanian or Chamorro (52); Samoan (53); Other Pacific Islander (54); other (60); No additional choices (88); don’t know/not sure (77); and refused (99). For this study, race and ethnicity were combined into three categories of White, non-Hispanic (1 [ethnicity 5, and race 10]), other races, non-Hispanic (2 [ethnicity 5, and race 20, 30, 40, 41, 42, 43, 44, 45, 46, 47, 50, 51, 52, 53, 54, 60]), and Hispanic (3 [ethnicity 1-4]). No additional choices (88), don’t know/not sure (77), and refused (99)
were treated as missing data. The constructed race/ethnicity variable was represented in the logistic regression analysis with two dummy coded variables (Hispanic \([\text{yes} = 1, \text{no} = 0]\), and other races, non-Hispanic \([\text{yes} = 1, \text{no} = 0]\)) and White, non-Hispanic as the reference.

Education was assessed using the following response options (Appendix C): never attended school or only attended kindergarten (1); grades 1 through 8 (elementary) (2); grades 9 through 11 (some high school) (3); grade 12 or GED (high school graduate) (4); college 1 year to 3 years (some college or technical school) (5); college 4 years or more (college graduate) (6); or refused (9). For this study, these categories were combined to create a dichotomous variable: less than college degree (1 [1, 2, 3, 4 and 5]) and graduated college (0 [6]). Refused (9) was treated as missing data.

Employment was assessed using the following response options (Appendix C): employed for wages (1); self-employed (2); out of work for 1 year or more (3); out of work for less than 1 year (4); a homemaker (5); a student (6); retired (7), unable to work (8); and refused (9). For this study, these categories were combined to create a three category variable: employed (0 [1 and 2]), unemployed or unable to work (1 [3, 4, 5, 6, and 8]), and retired (2 [8]). Refused (9) was treated as missing data. The constructed employment variable was represented in the logistic regression analysis with two dummy coded variables (as employed \([\text{yes} = 1, \text{no} = 0]\), unemployed \([\text{yes} = 1, \text{no} = 0]\)) and retired as the reference.

Income was assessed using the following response options (Appendix C): $20,000 to less than $25,000 (04); 15,000 to less than $20,000 (03); $10,000 to less than $15,000 (02); less than $10,000 (01); $25,000 to less than $35,000 (05); $35,000 to less than
$50,000 (06); $50,000 to less than $75,000 (07); $75,000 or more (08); don’t know/not sure (77); and refused (99). For this study variable, responses were combined to create a dichotomous variable: less than $35,000 (1 [01, 02, 03, 04, 05]), and $35,000 or greater (0 [06, 07, 08]). Response options “don’t know/not sure” (77) and “refused” (99) were treated as missing data.

Wealth was assessed by the BRFSS housing tenure question (Appendix C). Response options were: own (1); rent (2); other arrangements (3); don’t know/not sure (7); and refused (9). For this study, low wealth was defined as renting (1 [2 or 3], and high wealth was defined as owning a home (0 [1]). Studies identifying associations between homeownership and lower rates of suicidality, as well as renting and increased rates of suicidality support the validity of this variable (Lewis & Sloggett, 1998; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005). Response options “don’t know/not sure” (7) and “refused” (9) were treated as missing data.

**Psychosocial Intermediary Determinants**

Two BRFSS questions assessed the psychosocial intermediary determinants of suicide risk. The first question assessed depression diagnosis within the respondent’s lifetime, and the second question assessed the number of days in a month when mental health was not good (Appendix D). These two variables were assessed separately.

The depression variable was created from the lifetime diagnosis of depression question, yes (1), no (2), don’t know/not sure (7), or refused (9). The variable was then recoded as depression yes (1 [1]) or no (0 [2]). Number of days in the past 30 when mental health was not good was a continuous variable recoded into a three category variable by the CDC of: zero days (0); 1-13 days (1); and 14+ days (2) (CDC, 2013).
Refused (99) and don’t know/not sure (77) were treated as missing data. For logistic regression analysis, the depression variable was recoded no (0) and yes (1), and number of mentally unhealthy days was dichotomized to 14 days or more days of poor mental health (1) and less than 14 mentally unhealthy days per month (0).

**Behavioral and Physical Intermediary Determinants**

Behavioral and physical intermediary determinants of suicide risk were assessed using five BRFFS questions: (1) exercise in the past 30 days, (2) binge drinking, (3) drinking and driving (4) general health, and (5) activity limitation due to health (Appendix E). Exercise in the past 30 days was assessed as yes (1 [01]); or no (0 [02]). Binge drinking, which was defined as drinking five or more alcoholic drinks on the same occasion (i.e., at the same time or within a couple hours of each other) for males and four or more such drinks for females, was assessed as a continuous variable. For this study, binge drinking was constructed into a dichotomous variable of yes (1), no (0). Drinking and driving in the last 30 days when the respondent had too much to drink was assessed as a continuous variable. For this study, drinking and driving was constructed into a dichotomous variable of yes (1), no (0). Support for validity of the binge drinking and drinking and driving items is evidenced by the National Survey on Drug Use and Health (NSDUH) definition for binge alcohol use (Blazer & Wu, 2009; Department of Health and Human Services, 2016; Wechsler, Dowdall, Davenport & Rimm, 1995). General health was assessed by five categories of: excellent (1), very good (2), good (3), fair (4), poor (5). Two response options were then created for the general health variable of: good or better health (0 [1, 2, or 3]); and fair to poor health (1 [4 or 5]). Activity limitation due
to health was categorized as yes (1 [01]); or no (0 [01]). Responses of “don’t know/not sure” (7) or “refused” (9) were treated as missing data.

**Access to Health Care**

Access to health care was assessed using two BRFSS questions (Appendix G): (1) current health care coverage and (2) inability to access health care due to cost in the past 12 months. Response options to both questions are yes (1), no (2), and don’t know/not sure (7) and refused (9). Response options were recoded to yes (1), no (0). Responses of “don’t know/not sure” (7) or “refused” (9) were treated as missing data.

**Data Analysis**

Analysis began by assessing missing data and frequencies for variables of interest. Sample characteristics of the population were summarized using descriptive statistics. As this is a secondary data analysis, University of Miami’s Institutional Review Board (IRB) approved this study as being of exempt status for full IRB review (Appendix A).

AIM 1: To estimate the 2016 prevalence of adult suicide risk in Monroe County and associated socio-demographic characteristics, and socioeconomic structural and intermediary determinants.

*Research Question 1: What is the estimated prevalence of suicide risk among Monroe County adult residents in 2016?*

*Analysis.* Prevalence estimates, standard errors, and 95% confidence intervals of suicide risk were assessed based on a univariate statistical analysis using weights and strata to account for the complex survey design. Although CDC does not recommend
analyzing subgroups with numbers less than 50, because the suicide risk subgroup number was relatively close to 50 \( (n = 49) \), analyses preceded and confidence intervals were examined.

**Research Question 2: What are the sociodemographic characteristics, and socioeconomic structural and intermediary determinants of Monroe County adult residents at risk for suicide in 2016?**

**Analysis.** Chi square tests of differences were used to assess whether frequencies of self-reported sociodemographic characteristics, and socioeconomic structural and intermediary determinants were significantly higher among those at risk for suicide than the general population. Chi square tests were performed using SAS 9.4 (SAS Institute Inc, Cary, NC, 2012). A significant chi-square was considered evidence of a significant relationship between the sociodemographic characteristic, and socioeconomic structural and intermediary determinants and risk of suicide.

**AIM 2: To examine the multivariate associations among sociodemographic characteristics, and socioeconomic structural and intermediary determinants and suicide risk among 2016 Monroe County, Florida adult residents.**

**Research Question 1: Will sociodemographic characteristics, and socioeconomic structural and intermediary determinants each be associated with an increased risk for suicide among 2016 Monroe County, Florida adult residents?**

**Analysis.** Hierarchical multivariate logistic regression was used to examine associations among sociodemographic characteristics, and socioeconomic structural and intermediary determinants and suicide risk. The inclusion of variables into the hierarchical regression was guided by the adapted Social Determinants of Health Conceptual Model (Figure 1).
All multivariate analyses were performed in Mplus (v7.11) using maximum likelihood estimates to address issues of missing data to help ensure stable estimates. Additionally, only variables found to be statistically significant in the Chi square analysis were assessed in the series of hierarchical multivariate logistic regression models. Variables found to have significant associations with suicide risk were entered into regression models grouped together based on the conceptual model. All conceptually different groups were modeled separately. The final model consisted of all significant variables from each of the previously modeled conceptual groups. Correlations of all variables included in the model were assessed for multicollinearity prior to being entered into the regression. All variables included in the model were dummy coded.

**AIM 3:** To examine the interaction of socioeconomic structural determinants with access to health care, with race and ethnicity, and with gender on suicide risk among Monroe County, Florida adults.

**Research Question 1:** Will significant correlates of socioeconomic structural determinants of suicide risk interact with access barriers to health care to increase suicide risk among adult 2016 Monroe County, Florida residents?

**Research Question 2:** Will significant correlates of socioeconomic structural determinants of suicide risk interact with race and ethnicity to increase suicide risk among adult 2016 Monroe County, Florida residents?

**Research Question 3:** Will significant correlates of socioeconomic structural determinants of suicide risk interact with gender to increase suicide risk among adult 2016 Monroe County, Florida residents?
Analysis. Aim 3 was addressed using a series of logistic regression models in which the dependent variable was suicide risk. Socioeconomic structural determinants found to have a significant relationship with suicide risk were entered into regression models, along with interaction terms involving both of the determinants. Race and ethnicity, gender and each access barrier to health care variable (cost and insurance) were assessed separately. The significance test for the interaction term was used to determine if an interaction was present in the models (see Table 1).

Table 3.1. Regression models assessing interactions of significant structural determinants of suicide risk with gender and health care access barriers.

<table>
<thead>
<tr>
<th>Regression Model</th>
<th>Independent Variables</th>
<th>Dependent Variable</th>
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<tbody>
<tr>
<td>1</td>
<td>Gender</td>
<td>Suicide Risk</td>
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<tr>
<td></td>
<td>Structural determinant</td>
<td></td>
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<tr>
<td></td>
<td>Structural determinant* Gender</td>
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<td></td>
<td>Health care access barrier (cost)</td>
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<td>2</td>
<td>Structural determinant</td>
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<tr>
<td></td>
<td>Structural determinant * Health care access barrier (cost)</td>
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<tr>
<td></td>
<td>Health care access barrier (insurance)</td>
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<td>3</td>
<td>Structural determinant</td>
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<tr>
<td></td>
<td>Structural determinant * Health care access barrier (insurance)</td>
<td></td>
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<tr>
<td>4</td>
<td>Race and Ethnicity</td>
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<tr>
<td></td>
<td>Structural determinant</td>
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</tr>
<tr>
<td></td>
<td>Structural determinant * Race and Ethnicity</td>
<td></td>
</tr>
</tbody>
</table>

Aim 4: To examine associations among sociodemographic characteristics and suicide risk question response among 2016 Monroe County, Florida adult residents.

Research Question 1: What are the sociodemographic characteristics of Monroe County adult residents who do not respond to the suicide risk questions in 2016?
**Analysis.** Chi square analysis were conducted to assess frequencies and differences between sociodemographic and suicide risk question response. All analyses were performed using SAS 9.4 (SAS Institute Inc, Cary, NC, 2012). A significant chi-square was considered evidence of a significant relationship between sociodemographic characteristics and suicide risk question response.

**Research Question 2: Will sociodemographic characteristics be associated with an increased odds of not answering the suicide risk questions among 2016 Monroe County, Florida adult residents?**

**Analysis:** Multivariate logistic regression was used to examine significant Chi Square associations among sociodemographic characteristics and suicide risk question response. Only variables found to be statistically significant in the Chi-square analysis of suicide risk were assessed in the multivariate logistic regression model. Correlations of all variables included in the model were assessed for multicollinearity before being included in the analysis. All variables included in the model were dummy coded.
Chapter 4
Socioeconomic Determinants of Suicide Risk in Monroe County, Florida, 2016 Behavioral Risk Factor Surveillance Survey
Suicide is the 10th leading cause of death in the U.S., and suicide rates continue to increase yearly (American Association of Suicidology, 2014; Centers for Disease Control and Prevention [CDC], 2017; SPRC, 2015). Although we know the impact of suicide reaches beyond the individual into the community (Luoma, Martin, & Pearson, 2002; Tidemalm, Langstrom, Lichtenstein, & Runeson, 2008), it is not clear how the community and associated social context influences suicide risk (Judd, Cooper, Fraser, & Davis, 2006; Westman, Hasselström, Johansson, & Sundquist, 2003). Socio-economic status (SES) is an important determinant known to influence injury and mortality (Cubbin, LeClere, & Smith, 2000; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005; Milner, Niven, & LaMontagne, 2015). Suicide could possibly be better prevented if the role of SES in the context of suicide risk was more understood (Cubbin, LeClere, & Smith, 2000; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005).

Studies investigating the relationship between SES and suicide found SES to be an important risk factor for suicide outcomes. (Cubbin, LeClere, & Smith, 2000; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005; Page, Morrell, Taylor, Carter, & Dudley, 2006). Unfortunately, these studies have conflicting findings (Cubbin, LeClere, & Smith, 2000; Denney, Rogers, Krueger, & Wadsworth, 2009; Lewis & Sloggett, 1998; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005; Milner, Niven, & LaMontagne, 2015). Some studies have found higher levels of SES to be associated with suicide, and others associated lower levels of SES with suicide (Cubbin, LeClere, & Smith, 2000; Denney, Rogers, Krueger, & Wadsworth, 2009; Lewis & Sloggett, 1998; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005; Milner, Niven, & LaMontagne, 2015). These conflicting findings make it difficult to understand exactly what aspects of SES contribute to suicide.
(Cubbin, LeClere, & Smith, 2000; Denney, Rogers, Krueger, & Wadsworth, 2009; Lewis & Sloggett, 1998; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005; Milner, Niven, & LaMontagne, 2015). Further, although a few studies on SES and suicide exist, these studies focus on the relationship between SES and suicide outcomes rather than exploring how SES contributes to overall suicide risk.

This paper explores the role of SES in suicide risk using population-based data from a Florida county with high suicide rates. Monroe County, home of the Florida Keys, is located outside of the large urban area of Miami, where suicide is the 5th leading cause of death for people under the age of 65, and where many socioeconomic factors found to be related to suicide are present (Monroe County, FL; Stein, Gennuso, Ugboaja, & Remington, 2017). Some examples of socioeconomic factors associated with suicide are increased alcohol use and decreased access to health care (Stein, Gennuso, Ugboaja, & Remington, 2017). These factors have similarly been associated with increased suicide rates outside other large U.S. urban areas as well (Stein, Gennuso, Ugboaja, & Remington, 2017).

The high rates of suicide in the Florida Keys may be the product of wealth disparities resulting in health inequalities (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; WHO, 2010). Medical care and food costs in the Florida Keys are higher than statewide averages (Monroe County Health Department, 2013), and the cost of living is comparable with New York and San Francisco, with a far lower median income, making affordable housing a problem (Monroe County Health Department, 2013). The high costs of living combined with lack of affordable housing, could be contributing to wealth disparities among county residents. Additionally, and similar to
many other U.S. rural counties, there is a shortage of primary care providers and mental health professionals throughout the county (Monroe County Health Department, 2013). Consequently, individuals that need physical or mental health care, may not be able to access that care, due to the costs associated with travel to providers and/or co-pays. As a result, those of lower SES may experience health inequalities driven by the high costs of living coupled with cost barriers to access health care. Therefore, the purpose of this study is to identify whether socioeconomic determinants are associated with suicide risk in the Florida Keys by conducting a secondary analysis of the Monroe County Behavior Risk Factor Surveillance System (BRFSS) 2016 data.

How different social conditions shape health inequalities is explained by the Determinants of Health Model (Black, Morris, Smith, & Townsend, 1980; Marmot, Rose, Shipley, & Hamilton, 1978). Health inequalities can lead to worsening disease states or injury outcomes, such as suicide (Black, Morris, Smith, & Townsend, 1980; Marmot, Rose, Shipley, & Hamilton, 1978). Suicide risk is known to be influenced by different mental and physical determinants, such as unmanaged mental health conditions, and some chronic and/or debilitating illnesses (Russell, Turner, & Joiner, 2009; Yoshimasu, Kiyohara, & Miyashita, 2008). However, what is not well understood, is the impact of wealth disparities on suicide risk in the context of mental and physical illnesses, and physical disabilities (Judd, Cooper, Fraser, & Davis, 2006; Westman, Hasselström, Johansson, & Sundquist, 2003; Page, Morrell, Taylor, Carter, & Dudley, 2006). For instance, the social determinants that contribute to wealth disparities may also contribute to health inequalities that lead to suicide risk. These associations could be better
understood by applying the Determinants of Health Model to assess suicide risk using population-based data (Dasgupta, Beletsky, & Ciccarone, 2018).

This study will assess the prevalence of suicide risk in Monroe County, and examine the association of suicide risk with the theoretical socioeconomic structural (education, income, employment and wealth) and intermediary determinants of suicide (behavior, biological and psychosocial) among Florida Keys residents. Since certain mental illnesses, such as depression, are well established in the literature as having a strong association with suicide risk (Yoshimasu, Kiyohara, & Miyashita, 2008), the psychosocial determinants of suicide were explored last in this study. Additionally, differences in suicide risk associated gender are also well established in the literature (Chang, 1998; Cubbin, LeClere, & Smith, 2000; Kessler, Borges, & Walters, 1999; Law, Snider, & De Leo, 2014; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005). Therefore, the potential for socioeconomic determinants of suicide risk having a combined influence with gender, as well as access barriers to health care, resulting in increased risk was tested with moderation.

**Conceptual Model**

Figure 3.1 depicts the adaptation of the Commission on Social Determinants of Health (CSDH) Conceptual Model that guided the analysis of this study (WHO, 2010). The Social Determinants of Health Conceptual Model clarifies how SES contributes to suicide risk, depending on the amount of wealth and social status achieved by an individual (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010). The conceptual model depicts how different
structural determinants of SES (education, employment, and income) contribute to wealth, and how wealth influences intermediary social determinants (behavioral, biological, and psychosocial) that contribute to outcomes of health inequality, and could result in suicide risk (WHO, 2010). The adaptation of this model to assess suicide risk is supported by Durkheim’s Theory of Social Integration (Durkheim, Simpson, & Spaulding, 1952), which explains how different social inequalities can lead to suicide. Durkheim’s theory supports that measures of the structural determinants of SES could be important predictors of the behavioral, biological and psychosocial intermediary determinants, such as physical illness, disability, or mental illness, which contribute to suicide risk (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010).

The CSDH model differs from other Social Determinants of Health models in two important ways. First, the socio-economic-political ecological context is incorporated into the conceptual framework (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; WHO, 2010) (WHO, 2010). The Monroe County socio-economic-political context, although unable to be measured by the individual level data captured in the BRFSS data set used in this study, is important to consider from the perspective of this study’s findings. For instance, the Monroe County social context of high costs of living and lack of affordable housing could be contributing to wealth disparities among the Monroe County residents. Second, the CSDH model explains the hierarchical progression of how different structural determinants (education, income, occupation) contribute to an individual’s socioeconomic status that is driven by wealth accumulation (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; WHO, 2010). The
conceptual progression of how these structural determinants lead to wealth and health from the perspective of suicide risk is described next.

**Socioeconomic Structural Determinants**

The socioeconomic structural social determinant in this model consists of education, occupation, income and wealth. As will be discussed later, race, ethnicity and gender are depicted in the model as moderators of these other structural determinants.

*Education* qualifies an individual for *employment* through occupation, which then leads to *income* and in turn results in *wealth* (Braveman, Egerter, & Williams, 2011; Kessler, Borges, & Walters, 1999; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010). Education, employment and income have been associated with suicide inconsistently, with lower levels of education, unemployment and low income contributing to higher rates of suicide in some studies, and higher levels of education, employment, and higher income associated with suicide in other studies (Cubbin, LeClere, & Smith, 2000; Kessler, Borges, & Walters, 1999; Milner, Niven, & LaMontagne, 2015). One possibility for the inconsistent findings is that these structural determinants are not a consistent measure of wealth. Instead, as per the CSDH model guiding this study, the combined influence of education, employment and income contribute to wealth. Additionally, differences in the unmeasured socioeconomic and political context that exists across conflicting studies may also contribute to these inconsistencies.

A better measure of SES could be the outcome of the different levels of education, employment and income that reflect an individual’s wealth (WHO, 2010). Wealth equates to an individual’s SES, as well purchasing power to obtain material
resources, such as home ownership. *Housing tenure*, the status of owning or renting your home, was used as a measure of wealth in this study. The use of housing tenure as a measure of wealth is consistent with other studies investigating the association of SES and suicide that found wealth, as measured by material assets, to be the SES measure most associated with suicide (Braveman, Egerter, & Williams, 2011; Lewis & Sloggett, 1998; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010).

Social class and wealth are reflections of social status and power (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010). The effect of social status and power on suicide risk is explained by Durkheim’s Theory of Social Integration, which postulates that lower levels of social status lead to less social integration and fewer opportunities, resulting in an increased risk for suicide (Duberstein, Conwell, Conner, Eberly, Evinger, & Caine, 2004; Durkheim, Simpson, & Spaulding, 1952; Kessler, Borges, & Walters, 1999; Portes, 2000). Therefore, it is important to assess the association of these socioeconomic structural determinants that comprise an individual’s SES with suicide risk in Monroe County.

*Race and ethnicity* refers to a social structural determinant of suicide risk that represents the social culture and heritage that individuals share (Krieger, 2002; Oquendo, Ellis, Greenwald, Malone, Weissman, & Mann, 2001; WHO, 2002; WHO, 2010). Suicide risk is more associated with the White race in the U.S., as they experience higher rates of suicide when compared to African Americans and Hispanics (Chang, 1998; Kessler, Borges, & Walters, 1999). However, in addition to differences in suicide rates between race and ethnic groups, suicide rates are also different for men as compared to women
(Chang, 1998; Cubbin, LeClere, & Smith, 2000; Kessler, Borges, & Walters, 1999; Law, Snider, & De Leo, 2014; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005). Gender is a socially constructed characteristic (Krieger, 2002; WHO, 2002; WHO, 2010). The social constructions of race, ethnicity and gender form foundations of stigma, division and discrimination. Stigma and discrimination could possibly interact with SES to contribute to increased suicide risk in many social contexts, including Monroe County. Therefore race, ethnicity and gender were assessed as moderating factors of SES and suicide risk in this study (Krieger, 2002; Krieger, 2005; WHO, 2002; WHO, 2010).

**Socioeconomic Intermediary Determinants of Suicide Risk**

The socioeconomic intermediary determinants of health result from socioeconomic structural determinants that contribute to an individual’s status and hierarchy within society, as moderated by health system access (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010). Different social hierarchies, as moderated by health care system access, can lead to different exposures and health-compromising vulnerabilities (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010). Compromised health leads to illness, which then in return, feeds back upon the individual’s social hierarchy by reducing income, employment opportunities and wealth which establishes an individual’s level of social class (Braveman, Egerter, & Williams, 2011; Lynch, Kaplan, & Shema, 1997; Wilkinson, & Marmot, 2003; WHO, 2010).

Several behavioral, psychosocial and biological intermediary determinants of health status have been associated with suicide risk. Examples of the psychosocial determinants associated with suicide risk are mental illness, such as *depression*, bipolar...
disorder and anxiety, and unmanaged mental health conditions (Bertolote & Fleischmann, 2002; Kim, 2016; Luoma, Martin & Pearson, 2002). Subsequently, worsening psychosocial disorders can lead to behavioral determinants that are also associated with an increased risk for suicide, such as lack of exercise or substance use (Luoma, Martin, & Pearson, 2002; Tidemalm, Langstrom, Lichtenstein, & Runeson, 2008). Worsening health conditions and activity limitations caused by physical illness are biological determinants that have also been associated with increased suicide risk in the literature (Kim, 2016; Khatoon, Khalid, Fatima, & Minhas, 2015).

Methods

A secondary analysis of Monroe County, Florida 2016 BRFSS data was conducted to assess the socioeconomic structural and intermediary determinants of suicide risk among adult residents. BRFSS is one of the United States’ primary sources of health information used to set health goals and monitor public health progress at national, state, and local levels. BRFSS uses a complex non-probability based sampling method that includes stratification and cluster sampling to collect uniform, generalizable, county-level data every three years from the noninstitutionalized U.S. civilian population greater than 18 years of age (CDC, 2013). Trained interviewers, using a computer-assisted random-digit dialing telephone interviewing (CATI) system, collect data from a standardized questionnaire throughout the year, on a monthly basis, from the US adult population with landline telephones and/or cellphones (CDC, 2013; Florida Department of Health, 2016). Responses are weighted according to the respondent's probability of selection, and the age, sex, and race/ethnicity-specific distribution of the population using
post-census projections for each state, county and territory (CDC, 2013). Detailed weighting and analytic methodologies have been previously published (CDC, 2017; Florida Department of Health, 2016; Pierannunzi, Hu, & Balluz, 2013).

**Study Measures**

The measures used to assess the socioeconomic structural and intermediary determinants of suicide risk in this analysis are discussed next. The independent variables used to assess suicide risk are discussed within each respective socioeconomic determinant subgroup of structural and intermediary. Although not discussed here, all measures used included response options of “don’t know/Not sure” and “Refused”. Demographic characteristics used to help describe the population included age in years (18-44 [0], 45 and greater [1]) and marital status (married/unmarried couple [1], single [2], widowed [3]).

Lifetime suicide risk (yes = 1, no = 0) was constructed using the revised Suicidal Behaviors Questionnaire (SBQ-R) items 1, 3 and 4 (Osman et al., 2001). A cutoff score of two on SBQ-R item 1 was used for suicide risk (Osman et al., 2001). Additionally, if respondents reported ever telling someone they would suicide (Item 3), or thinking they would die by suicide one day (Item 4), then those respondents were also included in the suicide risk subpopulation. The SBQ-R total score could not be calculated because item 2 was not administered in the survey correctly. Therefore, responses to items 1, 3 and 4 only were included to determine the risk subpopulation. Construct validity of these questions supports this approach (Crosby, Gfroerer, Han, Ortega, & Parks, 2011; Osman et al., 2001; SAMHSA, 2016; SAMHSA, 2017).
Structural Determinants

Structural determinants of interest included gender (male [0], female [1]), race and ethnicity (White, non-Hispanic [0]; other races, non-Hispanic [1]; Hispanic [2]), education (did not graduate college [1], graduated college [0]), employment (employed [0]), unemployed or unable to work [1], retired [2]), income (less than $35,000 [1]; $35,000 or greater [0]), and housing tenure (owning a home [0], renting a home or other arrangements [1]). As discussed previously, housing tenure was used as a proxy measure for wealth in this study. For purposes of this study, low wealth was defined as homeownership response options of renting or other arrangements (1), and high wealth was defined as a homeownership response of own (0). Previous studies establishing associations between housing tenure and suicidality support the validity of this approach (Lewis & Sloggett, 1998; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005).

Behavioral, Physical and Psychosocial Intermediary Determinants

The socioeconomic behavioral and physical intermediary determinants were assessed using five questions: (1) “during the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?”; (2) “would you say that in general your health is” (excellent, very good, good, fair, poor); (3) “during the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work or recreation?”; (4) “considering all types of alcoholic beverages, how many times during the past 30 days did you have ( 5 for men, 4 for women) or more drinks on an occasion?”; and (5) “during the past 30 days, how many times have you driven when you’ve had perhaps too much to drink?”
Responses to the exercise question were used to create the “no exercise” variable (yes [0], no [1]). Responses to the general health question were used to create the “fair to poor health” variable of yes (1) and no (0). Responses to the activity limitation due to health question were used to create the “activity limitation” variable dichotomized as yes (1 [1 day or more days of activity limitation due to health]) and no (0 [0 days of no activity limitation due to health]). Responses to the number of drinks on any occasion question were used to create the “binge drinking” variable dichotomized as (yes [1], no [0]). Responses to the drinking and driving question were used to create the “drinking and driving” variable dichotomized as (yes [1], no [0]).

The psychosocial intermediary determinant was assessed using two BRFSS questions: (1) “has a doctor, nurse, or other health professional ever told you that you have a depressive disorder (including depression, major depression, dysthymia, or minor depression)?”; and (2) “now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?”. The question assessing lifetime diagnosis of depression was used for the depression variable (yes [1], no [0]). Number of days in the past 30 when mental health was not good was a continuous variable that was transformed into a three category variable of: zero days (0); 1-13 days (1); and 14+ days (2) (CDC, 2013).

Access to health care was assessed using two questions: (1) “do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, Government plans such as Medicare, or Indian Health Service?” (yes [0], no [1]), and (2) “was there a time in the past 12 months when you needed to see a doctor but could not because of cost?” (yes [1], no [0]).
Analysis

Prevalence estimates, standard errors, and 95% confidence intervals of suicide risk were generated using a series of univariate analyses that incorporated weights and strata to account for the complex survey design. Chi-square tests of significance assessed whether certain sociodemographic characteristics and different socioeconomic structural and intermediary determinants were associated with an increased risk for adult suicide among 2016 Monroe County, Florida residents. Significance was assessed using an alpha level of $\leq .05$. Univariate analyses and chi square tests of significance were performed using SAS 9.4 (SAS Institute Inc, Cary, NC, 2012). All responses of “don’t know” and “not sure” were treated as missing data.

A logistic regression model including all theorized predictors of wealth (education, employment, and income) were entered into a model. Next, a series of four hierarchical logistic regressions were used to build successive models that progressed from the socioeconomic structural determinants of suicide risk, to the socioeconomic intermediary determinants of suicide risk, and then lastly, a final model that included all significant socioeconomic structural and intermediary determinants of suicide risk. In the first model, all structural determinants identified to be significantly associated with suicide risk through univariate analysis were regressed on suicide risk. In the second model, all behavioral and biological intermediary determinants identified as significantly associated with suicide risk through univariate analysis were regressed on suicide risk. The third mode combined the psychosocial determinants significantly associated with suicide risk through univariate analysis with only the behavioral and biological
determinants that remained significant in model two. The final model (model 4) was constructed of only the significant structural and intermediary determinants of suicide risk.

Finally, the possibility of socioeconomic structural determinants interacting with race/ethnicity, gender and barriers to health care access were investigated for potential moderation leading to increased suicide risk (Judd, Cooper, Fraser, & Davis, 2006; Monroe County Health Department, 2013; Westman, Hasselström, Johansson, & Sundquist, 2003). Three logistic regression models were used to assess whether significant socioeconomic structural determinants and the interaction term with gender, and the two different measures of health care access barriers (insurance and cost) had a combined effect, greater than individual effects, contributing to increased suicide risk in Monroe County. Significance was assessed using an alpha level of ≤ .05. All logistic regression analyses were conducted using maximum likelihood estimates to address issues of missing data in Mplus (v7.11) (Horton & Kleinman, 2007).

Results

Population Characteristics

The 2016 Monroe County data set contained 528 respondents 18 years and older. Most of these respondents were white (70%). Over a third had graduated college (37%), and most were either employed (64%) or retired (22%). Of those reporting income, 41% earned less than $35,000 per year, about a third of the population earned between
$35,000 and less than $75,000 per year (31%), and a little more than a quarter (27%) earned $75,000 or more per year. Half of the population (51%) were married or a non-married couple (see also Table 4.1).

**Univariate Analysis**

About a third of the population (32%; \( n = 109, CI = 26.45-38.38 \)) did not respond to the suicide risk items. Of those who responded, 7.34% (\( n = 49, CI = 4.27-10.41 \)) were at risk for suicide. Those at risk for suicide reported significantly more depression (\( \chi^2 [1, n = 417] = 105.5, p = .001 \)), less exercise (\( \chi^2 [1, n = 419] = 14.7, p = .009 \)), more unemployment (\( \chi^2 [3, n = 417] = 52.6, p = .001 \)), and poorer mental health (\( \chi^2 [2, n = 411] = 36.6, p = .001 \)) and general health (\( \chi^2 [1, n = 417] = 14.3, p = .011 \)), as well as more activity limitation due to health (\( \chi^2 [1, n = 408] = 34.3, p = .001 \)) than those not at risk for suicide (Tables 4.1 and 4.2). Additionally, those at risk for suicide were more likely to be renters (\( \chi^2 [1, n = 418] = 12.9, p = .012 \)) than those not at risk for suicide.

**Logistic Regression Explaining Low Wealth**

The structural determinants of education, income and employment were regressed onto renting. As can be seen from the regression results in Table 4.3, all structural determinants remained significant: less than college degree (\( B = 1.02, SE = 0.345, p < .003 \)), employed (\( B = 2.095, SE = 0.535, p < .001 \)) and making less than $35,000 per year (\( B = 1.484, SE = 0.379, p < .001 \)).

**Hierarchical Logistic Regression of Socioeconomic Structural Determinants**

Model 1 regressed the socioeconomic structural determinants identified as significant in the chi-square analysis of less than education and housing tenure onto
suicide risk. As can be seen from the regression results in Table 4.4, Model 1, only renting a home remained significant ($B = 1.805$, $SE = 0.513$, $p < .0001$).

Model 2 regressed the significant socioeconomic behavioral and biological intermediary determinants identified as significant in the univariate analysis onto suicide risk. As can be seen from the regression results in Table 4.5, Model 2, only activity limitation due to health remained significant ($B = 2.207$, $SE = 0.853$, $p < .010$).

Model 3 regressed the significant intermediary determinants from Model 2 and the significant psychological intermediary determinants identified as significant in the univariate analysis onto suicide risk. As can be seen from the regression results in Table 4.5, Model 3, only two variables remained significant: depression ($B = 2.371$, $SE = 0.779$, $p < .002$) and greater than 14 mentally unhealthy days per month ($B = 2.387$, $SE = 0.928$, $p < .010$) when controlling for all other variables.

Model 4 regressed the significant intermediary determinants from Model 3 and the significant structure determinants from model 1 onto suicide risk. As can be seen in Table 4.6, Model 4, both depression ($B = 2.369$, $SE = 0.858$, $p < .006$) and greater than 14 mentally unhealthy days per month ($B = 2.387$, $SE = 0.928$, $p < .011$) remained significant. Depression increased the odds of suicide risk 10.7 times ($CI = 10.7, 57.4$) and greater than 14 mentally unhealthy days per month increased the odds of suicide risk by 7.6 times ($CI = 1.6, 36.4$) when controlling for all other variables.

**Moderation**

Tests for moderation examined the significant structural determinants of suicide risk with gender and health care access (cost and insurance) (Table 4.7). No interaction terms remained significant when entered into the regression model ($p \geq 0.177$).
Table 4.1. Prevalence estimates of suicide risk by sociodemographic characteristics and socioeconomic structural determinants of suicide risk, Monroe County Florida BRFSS 2016.

<table>
<thead>
<tr>
<th>Determinants</th>
<th>Monroe County</th>
<th>Suicide Risk</th>
<th>No Suicide Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. In Sample</td>
<td>%a (95% CI)</td>
<td>No. In Sample</td>
</tr>
<tr>
<td>Overall (weighted)</td>
<td>528 (65,411)</td>
<td>49 (4,802)</td>
<td>370 (39,407)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>244</td>
<td>53.2</td>
<td>22</td>
</tr>
<tr>
<td>Female</td>
<td>283</td>
<td>46.8</td>
<td>27</td>
</tr>
<tr>
<td>Age Group (yrs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-44</td>
<td>79</td>
<td>27.2</td>
<td>6</td>
</tr>
<tr>
<td>&gt; 45</td>
<td>449</td>
<td>72.8</td>
<td>43</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, non-Hisp. b</td>
<td>405</td>
<td>70.2</td>
<td>40</td>
</tr>
<tr>
<td>Other race(s), non-Hisp. b</td>
<td>27</td>
<td>7.5</td>
<td>4</td>
</tr>
<tr>
<td>Hispanic</td>
<td>85</td>
<td>22.4</td>
<td>5</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; College Grad</td>
<td>303</td>
<td>62.7</td>
<td>27</td>
</tr>
<tr>
<td>College Grad</td>
<td>224</td>
<td>37.3</td>
<td>22</td>
</tr>
<tr>
<td>Housing Tenure c</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own</td>
<td>370</td>
<td>55.1</td>
<td>30</td>
</tr>
<tr>
<td>Rent/other</td>
<td>153</td>
<td>44.9</td>
<td>19</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; $35,000</td>
<td>139</td>
<td>41.4</td>
<td>19</td>
</tr>
<tr>
<td>$35,000 or more</td>
<td>280</td>
<td>58.6</td>
<td>21</td>
</tr>
</tbody>
</table>

a: 95% confidence interval; p: p-value.
Table 4.1. Continued.

<table>
<thead>
<tr>
<th>Determinants</th>
<th>Monroe County</th>
<th>Suicide Risk</th>
<th>No Suicide Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. In Sample</td>
<td>%&lt;sup&gt;a&lt;/sup&gt; (95% CI)</td>
<td>No. In Sample</td>
</tr>
<tr>
<td>Employment Status&lt;sup&gt;c&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>261</td>
<td>64.6</td>
<td>58.9-70.2</td>
</tr>
<tr>
<td>Unemployed/ unable to work</td>
<td>63</td>
<td>13.2</td>
<td>9.1-17.3</td>
</tr>
<tr>
<td>Retired</td>
<td>200</td>
<td>22.2</td>
<td>17.5-27.0</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/ Couple</td>
<td>284</td>
<td>50.6</td>
<td>45.5-57.7</td>
</tr>
<tr>
<td>Single</td>
<td>160</td>
<td>39.5</td>
<td>33.3-45.8</td>
</tr>
<tr>
<td>Widowed</td>
<td>77</td>
<td>8.8</td>
<td>5.2-12.6</td>
</tr>
</tbody>
</table>

<sup>a</sup> Weighted percentages.

<sup>b</sup> Hisp. is abbreviation for Hispanic.

<sup>c</sup> Predictors included in hierarchical regression models.
Table 4.2. Prevalence estimates of suicide risk by biological and psychological intermediary determinants of suicide risk, Monroe County Florida BRFSS 2016.

<table>
<thead>
<tr>
<th>Determinants</th>
<th>Monroe County</th>
<th>Suicide Risk</th>
<th>No Suicide Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. In Sample</td>
<td>%a (95% CI)</td>
<td>No. In Sample</td>
</tr>
<tr>
<td>Overall (weighted)</td>
<td>528 (65,411)</td>
<td>49 (4,802)</td>
<td>370 (39,407)</td>
</tr>
<tr>
<td>Depression</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>62 11.2 7.3-15.1</td>
<td>22 54.2 32.5-75.8</td>
<td>24 5.0 1.7-8.3</td>
</tr>
<tr>
<td>No</td>
<td>464 88.8 84.9-92.7</td>
<td>27 45.8 24.2-67.4</td>
<td>344 95.0 91.7-98.2</td>
</tr>
<tr>
<td>Exercise past 30 days</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>385 69.7 64.2-75.2</td>
<td>32 43.8 22.6-65.0</td>
<td>275 71.7 65.0-78.5</td>
</tr>
<tr>
<td>No</td>
<td>142 30.3 24.8-35.8</td>
<td>17 56.1 35.0-77.4</td>
<td>95 28.3 21.5-35.0</td>
</tr>
<tr>
<td>Health Care Coverage &lt; 65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>217 65.1 58.1-72.1</td>
<td>21 68.5 43.7-93.3</td>
<td>151 71.0 62.0-79.9</td>
</tr>
<tr>
<td>No</td>
<td>70 34.9 27.9-41.9</td>
<td>7 31.4 6.7-56.3</td>
<td>35 29.0 20.1-38.0</td>
</tr>
<tr>
<td>No Health Care Access - Cost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>64 15.9 11.3-20.4</td>
<td>7 22.7 3.5-42.0</td>
<td>36 11.4 6.4-16.3</td>
</tr>
<tr>
<td>No</td>
<td>462 84.1 79.6-88.7</td>
<td>42 77.3 58.0-96.5</td>
<td>334 88.6 83.7-93.6</td>
</tr>
<tr>
<td>General Health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good or Better</td>
<td>443 85.3 80.8-89.8</td>
<td>36 65.1 44.1-86.1</td>
<td>314 86.7 81.8-91.7</td>
</tr>
<tr>
<td>Fair or Poor</td>
<td>82 14.7 10.2-19.2</td>
<td>13 34.9 13.9-55.9</td>
<td>54 13.3 8.3-18.2</td>
</tr>
</tbody>
</table>
Table 4.2. Continued.

<table>
<thead>
<tr>
<th>Determinants</th>
<th>Monroe County</th>
<th>Suicide Risk</th>
<th>No Suicide Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. In Sample</td>
<td>% (95% CI)</td>
<td>% (95% CI)</td>
</tr>
<tr>
<td><strong>Not good mental health</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zero days per month</td>
<td>397</td>
<td>74.5 69.8-79.7</td>
<td>26</td>
</tr>
<tr>
<td>1-13 days per month</td>
<td>73</td>
<td>15.6 11.0-20.1</td>
<td>10</td>
</tr>
<tr>
<td>14+ days per month</td>
<td>49</td>
<td>9.9 6.3-13.5</td>
<td>13</td>
</tr>
<tr>
<td><strong>Activity Limitation</strong>&lt;sup&gt;b&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>107</td>
<td>18.9 13.9-23.9</td>
<td>22</td>
</tr>
<tr>
<td>No</td>
<td>376</td>
<td>81.1 76.1-86.2</td>
<td>25</td>
</tr>
<tr>
<td><strong>Binge Drinking</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>93</td>
<td>22.1 16.9-27.3</td>
<td>13</td>
</tr>
<tr>
<td>No</td>
<td>397</td>
<td>78.0 72.8-83.2</td>
<td>35</td>
</tr>
</tbody>
</table>

<sup>a</sup>Weighted percentages.

<sup>b</sup>Predictors included in hierarchical regression models.
Table 4.3. Logistic regression of socioeconomic structural determinants of low wealth, Monroe County Florida BRFSS 2016.

<table>
<thead>
<tr>
<th>Structural Determinants</th>
<th>B</th>
<th>SE</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than college degree</td>
<td>1.156</td>
<td>0.484</td>
<td>3.2*</td>
<td>1.2, 8.2</td>
</tr>
</tbody>
</table>

Education, Occupation & Income
- College Grad (ref) | 1.00 | 1.00 | 1.00 | 1.00 |
- Unemployed/disabled | -0.500 | 0.721 | 0.6 | 0.1, 2.5 |
- Retired | -2.108 | 0.797 | 0.1** | 0.0, 0.6 |
- Employed (ref) | 1.00 | 1.00 | 1.00 | 1.00 |
- Less than $35,000 per year | 1.731 | 0.529 | 5.6** | 2.0, 15.9 |
- $35,000 or more (ref) | 1.00 | 1.00 | 1.00 | 1.00 |

* p value of ≤ 0.05.
** p value of ≤ 0.001.

Table 4.4. Logistic regression of structural determinants on suicide risk, Monroe County Florida BRFSS 2016.

<table>
<thead>
<tr>
<th>Structural Determinants</th>
<th>B</th>
<th>SE</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than college degree</td>
<td>0.227</td>
<td>0.632</td>
<td>1.3</td>
<td>0.4, 4.3</td>
</tr>
<tr>
<td>College Grad (ref)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Renting</td>
<td>1.207</td>
<td>0.597</td>
<td>3.3*</td>
<td>10.8</td>
</tr>
<tr>
<td>Home ownership (ref)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* p value of ≤ 0.05.
** p value of ≤ 0.001.
Table 4.5. Hierarchical logistic regression of socioeconomic behavioral, biological and psychosocial intermediary determinants of suicide risk, Monroe County Florida BRFSS 2016.

<table>
<thead>
<tr>
<th>Intermediary Determinants</th>
<th>B</th>
<th>SE</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 2. Behavioral, and Biological Determinants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No exercise in past month</td>
<td>1.278</td>
<td>0.785</td>
<td>3.6</td>
<td>0.8, 16.7</td>
</tr>
<tr>
<td>Exercised in past month (ref)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Fair to poor health</td>
<td>-1.443</td>
<td>0.906</td>
<td>0.2</td>
<td>0.0, 1.4</td>
</tr>
<tr>
<td>Good health (ref)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Activity limitation due to health</td>
<td>2.207</td>
<td>0.853</td>
<td>9.1*</td>
<td>1.7, 48.4</td>
</tr>
<tr>
<td>No activity limitation due to health (ref)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>Model 3. Psychosocial &amp; Significant Behavioral &amp; Biological Determinants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activity limitation due to health</td>
<td>0.589</td>
<td>0.722</td>
<td>1.8</td>
<td>0.4, 7.4</td>
</tr>
<tr>
<td>No activity limitation due to health (ref)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Depression</td>
<td>2.371</td>
<td>0.779</td>
<td>10.7*</td>
<td>2.3, 49.3</td>
</tr>
<tr>
<td>No depression (ref)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>14+ mentally unhealthy days per months</td>
<td>2.387</td>
<td>0.928</td>
<td>10.9*</td>
<td>1.8, 67.0</td>
</tr>
<tr>
<td>&lt; 14 mentally unhealthy days per months (ref)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* *p value of ≤0.05.
** **p value of ≤0.001.
Table 4.6. Logistic regression of structural and intermediary determinants of suicide risk, Monroe County Florida BRFSS 2016.

<table>
<thead>
<tr>
<th>Determinants</th>
<th>B</th>
<th>SE</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 4. Structural &amp; Intermediary Determinants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renting</td>
<td>-0.131</td>
<td>0.741</td>
<td>0.9</td>
<td>0.2, 3.8</td>
</tr>
<tr>
<td>Home Ownership (ref)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Depression</td>
<td>2.369</td>
<td>0.858*</td>
<td>10.7</td>
<td>2.0, 57.4</td>
</tr>
<tr>
<td>No depression (ref)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>14+ mentally unhealthy days per months</td>
<td>2.030</td>
<td>0.799*</td>
<td>7.6</td>
<td>1.6, 36.5</td>
</tr>
<tr>
<td>&lt; 14 mentally unhealthy days per months (ref)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*p value of ≤ 0.05.
**p value of ≤ 0.001.

Table 4.7. Regression models assessing interactions of significant structural determinants of suicide risk with gender and health care access barriers.

<table>
<thead>
<tr>
<th>Regression Model</th>
<th>Independent Variables</th>
<th>Dependent Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Renting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Renting * Gender</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health care access barrier (cost)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Renting</td>
<td>Suicide Risk</td>
</tr>
<tr>
<td></td>
<td>Health care access barrier (cost)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Renting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health care access barrier (insurance)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Renting</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Health care access barrier (insurance)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>* Renting</td>
<td></td>
</tr>
</tbody>
</table>

Discussion

The prevalence of suicide risk in the Florida Keys observed in the 2016 BRFSS data is over 3% higher than national and Florida State estimates of suicide risk (SAMHSA, 2016; SAMHSA, 2017). Those at risk for suicide in the Florida Keys were more likely to be renters and less likely to own a home when compared to those not at
risk for suicide. The percentage of cost-burdened households in the Keys (those paying more than 30% of income for rent or mortgage) exceeds statewide estimates by 8%, and the Florida Keys has a higher percentage of renters (44%) than the rest of Florida (33%) (Monroe County Health Department, 2013).

Over 19% of Florida Keys households pay more than 50% of monthly household income for housing (Monroe County Health Department, 2013). Housing instability is defined as paying more than 50% of household income on housing, and having difficulty paying rent (Kushel, Gupta, & Haas, 2006; Urban Institute, 2002). In this study, of all the socioeconomic structural determinants of suicide risk, housing tenure was the most associated. Renting was significantly associated with a more than 3-fold increase in suicide risk. This finding is consistent with other studies identifying an association between renting and increased risk for suicide in both probability based and non-probability based samples (Fowler, Gladden, Vagi, Barnes & Frazier, 2015; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005). Further, the structural determinants of less than a college education and making less than $35,000 a year were also significantly associated with renting in this population. Therefore, the study findings obtained here in the context of available county level data regarding housing costs suggest that housing instability could be a socioeconomic determinant contributing to suicide risk.

The findings of this study are consistent with other European studies that use housing as an indicator for SES when exploring suicide risk factors (Fowler, Gladden, Vagi, Barnes & Frazier, 2015; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005; Shaw, 2012). In contrast, U.S. research uses education, employment status, and yearly salary as indicators of SES (Cubbin, LeClere, & Smith, 2000; Kim et al, 2016; Lorant,
Kunst, Huisman, Costa, & Mackenbach, 2005; Milner, Niven, & LaMontagne, 2015). Unfortunately, studies using education, employment status, and yearly salary as SES indicators in the suicide literature have conflicting findings, suggesting these measures may not be an appropriate indicator of wealth (Cubbin, LeClere, & Smith, 2000; Denney, Rogers, Krueger, & Wadsworth, 2009; Lewis & Sloggett, 1998; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005; Milner, Niven, & LaMontagne, 2015). For example, education achieved early in life may not predict economic success and accumulation of wealth later in life (Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005). However, most home ownership requires achieving a certain level of financial credit and accumulation of financial resources for this investment. Other European studies that used measures of material resources, such as housing tenure or car ownership, as indicators of SES when examining suicidality found SES to be associated with suicide, consistently (Lewis & Sloggett, 1998; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005).

Notably, housing as a measure of SES in this study, emerged as a stronger predictor of suicide risk than income, employment, or education (Lewis & Sloggett, 1998; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005). Therefore, measures of wealth accumulation, such as housing tenure, may be a better predictor of the relationship between SES and suicide risk as compared to salary attainment measured by education, employment status or yearly income.

Psychosocial intermediary determinants of mental illness were other important determinants of suicide risk in this study, and depression is one of the most prevalent mental health conditions treated in the Florida Keys (Monroe County Health Department, 2013). This finding is not surprising given that depression is a well-established
determinant of suicide risk (Mann, et al., 2005; Isometsä, 2001; Yoshimasu, Kiyohara, & Miyashita, 2008; Cavanagh, Carson, Sharpe, & Lawrie, 2003). However, the current study’s findings shed further light on this well-known relationship in that the association between worsening mental health conditions, as indicated as greater than 14 mentally unhealthy days per month, and suicide risk remained independent from depression. These findings suggest that proper diagnosis and treatment of depression and other unmanaged mental health conditions could help reduce suicide risk. The robustness of this finding is supported by other studies documenting depression and worsening health conditions being associated with suicide, despite differences in sampling and measurement of depression and suicide risk (Kim, 2016; Khatoon, Khalid, Fatima, & Minhas, 2015). Further, when assessed together, psychosocial intermediary determinants of mental illness explained the association between socioeconomic structural determinants and suicide risk, providing support for the adaptation of the conceptual model applied in this study to assess suicide risk.

A strength of this study is that the measure of suicide risk (SBQ-R) used had undergone psychometric testing (Osman et al., 2001), and has been recommended for this type of research in other evaluative studies assessing the feasibility and effectiveness of suicide risk measures in population-based studies (Burless & De Leo, 2001). However, population-based suicide risk estimates using the SBQ-R measure, such as this study, could result in different estimates of suicide risk that are potentially driven by differences in measurement approach (e.g., lifetime risk versus 12-month risk), rather than actual differences in population suicide risk (Crosby, Gfroerer, Han, Ortega, & Parks, 2011;
SAMHSA, 2016; SAMHSA, 2017). Therefore, future research is needed using this measure in other population-based studies.

This study has some limitations. First, the outcome variable of suicide risk had about 30% missing data, which could lead to unstable estimates and misrepresentation of statistical relationships. However, to control for these missing data, all regression analyses were conducted in Mplus, using Maximum Likelihood estimation (Horton & Kleinman, 2007). Next, the low prevalence of suicide risk in our sample made identifying significant differences in subgroups more difficult due to wide confidence intervals, which also required collapsing some conceptually different categories. Nevertheless, consistent with prior literature, differences in suicide risk were observed to be associated with housing, depression, and greater than 14 mentally unhealthy days per month. These consistencies provide support for the validity of these findings despite the wide confidence intervals. Additionally, this study provides baseline estimates for future studies to assess the progression of change in suicide risk in the Florida Keys.

Despite these limitations, the findings of this study have implications for practice and policy. With respect to practice, primary care, public health and mental health nurses should consider assessing the socioeconomic status, such as housing conditions, of clients as part of screening for suicide risk. Lower socio-economic groups need improved access to psychiatric care. Therefore, public health nurses should work to promote policies that improve mental health coverage in low-cost healthcare plans as a means to improve access to this type of care.

Future research might benefit from using measures of wealth and material accumulation, such as housing, in studies of suicide risk (Lewis & Sloggett, 1998;
Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005). Additionally, this study could not evaluate whether decreasing suicide risk would correspondingly decrease county suicide rates. Hence, future studies should examine the association between population-based suicide risk and suicide rates using multi-level modeling of macro and individual level measures of suicide risk and rates. Finally, more longitudinal designed studies are needed to determine the temporal association of increasing suicide risk in association with increasing suicide rates.
Chapter 5
Sociodemographic Characteristics of Suicide Risk Question Nonresponse, Monroe County Florida Behavior Risk Factor Surveillance Survey, 2016
The U.S. Department of Health and Human Services’ (DHHS) Healthy People 2020 national mental health goal targets reducing suicide rates as a primary objective (DHHS, 2015). Since this objective was written in 2007, national suicide rates have actually increased (11.3 to 13.26 deaths per 100,000 individuals from 2007-2015) (AAS, 2014; CDC, 2017; DHHS, 2015; McIntosh & Drapeau, 2014; SPRC, 2015). In response to these increased rates, the U.S. Surgeon General’s National Strategy for Suicide Prevention identified increased suicide surveillance and research as essential for improving suicide prevention activities (DHHS, 2015).

U.S. population-based health surveys are a primary method for obtaining the critical behavioral health information used to inform the prevention of disease and injury, including suicide risk (Johnson, Hayes, Brown, Hoo, & Ethier, 2014). Unfortunately, selective nonresponse among completed population-based surveys adds to the difficulty of obtaining representative data (Brick, & Williams, 2013; Keeter, Kennedy, Dimock, Best, & Craighill, 2006). Moreover, suicide risk questions are even more subject to selective nonresponse due to the sensitive nature of the question items, potentially biasing results and leading to incomplete risk profiles (Groves et al., 2004; Klein et al., 2011; Lundberg, Damström, Hällström, & Forsell, 2005; McCabe & West, 2016; Plöderl, Kralovec, Yazdi, & Fartacek, 2011; Rässler, & Riphahn, 2006).

Elevated suicide risk has been found among college students not responding to online suicide risk questions, suggesting that suicide risk question nonresponse could be representative of a separate, more at risk group (Podlogar, et al., 2016). Additionally, those not responding to population-based survey questions have been found to represent a more vulnerable population of lower socio-economic status and worse health conditions.
Further, different races and ethnicities have different cultural beliefs about suicide that could also lead to suicide risk question nonresponse (Abdullah & Brown, 2011). These findings underscore the need to further understand whether certain sociodemographic characteristic are associated with suicide risk question nonresponse to better direct suicide research and prevention efforts.

To date, no studies have explored associations between sociodemographic characteristics and population-based suicide risk question nonresponse. Therefore, the purpose of this study was twofold. First, this study explored associations between suicide risk question nonresponse and sociodemographic characteristics using the Monroe County Florida 2016 Behavioral Risk Factor Surveillance Survey (BRFSS) data. Second, this study tested for differences in sociodemographic characteristics among suicide risk question nonresponders, those at risk and those not at risk for suicide. The Monroe County data provided a unique opportunity to examine these issues due to the inclusion of suicide risk questions in the county-wide BRFSS, and high county suicide rates (Florida Department of Health in Monroe County, 2017).

**Methods**

A secondary analysis of the Monroe County Florida 2016 BRFSS data was conducted to assess nonresponse to suicide risk questions among adult residents ($n = 528$). BRFSS is a yearly, ongoing telephone survey that gathers county-level generalizable data every three years for noninstitutionalized adults aged 18 years and older (CDC, 2013; CDC, 2017; Florida Department of Health, 2016; Pierannunzi, Hu, &
Balluz, 2013). BRFSS uses a complex, non-probability based sampling method that includes stratification and cluster sampling (CDC, 2013). Detailed weighting and analytic methodologies have been previously published (CDC, 2013; Florida Department of Health, 2016; Pierannunzi, Hu, & Balluz, 2013).

Sociodemographic characteristics of interest included gender (male [1], female [0]), and age in years (18-44 [0], greater than 45 [1]). Additional characteristics included race/ethnicity (White, non-Hispanic [1], other race(s)/non-Hispanic [2], Hispanic [3]), education (did not graduate high school [1], graduated high school [2], some college [3], graduated college [4]), and income (less than $35,000 [1], $35,000 to less than $75,000 [2], $75,000 or more [3]). Race/ethnicity was recoded into dummy variables for the logistic regression analysis (White, non-Hispanic [referent], other race(s)/non-Hispanic [0, 1], Hispanic [0, 1]). Education was recoded into dummy variables for the logistic regression analysis (did not graduate high school [0, 1], graduated high school [0, 1], some college [0, 1], graduated college [referent]).

Lifetime suicide risk (yes [1], no [0]) was created using the revised Suicidal Behaviors Questionnaire (SBQ-R) Items 1, 3 and 4 (Osman et al., 2001). The SBQ-R Item 2 could not be used due to a survey administration error. Therefore, the cut off score (Item 1, a cutoff score of two [Osman et al., 2001]) was combined with responses of having ever told someone they would commit suicide (Item 3), or thinking they would die by suicide one day (Item 4). The use of these response for inclusion in the suicide risk subpopulation is also supported through construct validity (Crosby, Gfroerer, Han, Ortega, & Parks, 2011; Osman et al., 2001; SAMHSA, 2016).
In the analyses described next, missing data on suicide risk questions were categorized in one of two ways: response and nonresponse. Suicide risk question response (0) was defined as responding to at least one of the three SBQ-R items. Nonresponse (1) was defined as SBQ-R question responses of “don’t know” and “refused” across all three items, item nonresponse across all three items, or a combination of don’t know/refused answers and item nonresponse across all three items.

Univariate analyses using weights and strata to account for the complex survey design were conducted to generate prevalence estimates, standard errors, and 95% confidence intervals of suicide risk question response.

Bivariate, chi-square tests of significance were used to make three types of comparisons. First, differences in demographic characteristics were assessed between suicide risk question response and nonresponse. Second, a dichotomous variable was constructed to assess differences in demographic characteristics between suicide risk question nonresponse (1, \( n = 109 \)) and no suicide risk (0, \( n = 370 \)). Third, a dichotomous variable was constructed to assess differences in demographic characteristics between suicide risk question nonresponse (1, \( n = 109 \)) and those at risk for suicide (0, \( n = 49 \)).

Lastly, multivariate logistic regression was conducted to assess associations among the sociodemographic characteristics that were significantly related to suicide risk question nonresponse in the first bivariate chi square set of comparisons. Multicollinearity was addressed by reviewing correlations among covariates prior to entering the variables into regression analysis. Income was not included in the multivariate logistic regression model due to multicollinearity issues with employment.
status. Significance was assessed using an alpha level of ≤ .05. All analyses were performed using SAS 9.4 (SAS Institute Inc, Cary, NC, 2012).

**Results**

Table 5.1 displays weighted estimates of sociodemographic characteristics and response to suicide risk questions. 32% \( (n = 109, CI = 26.5-38.4) \) of the population did not respond to any of the suicide risk questions. Results of the first chi square comparison tests displayed in Table 5.1 revealed persons not responding to the suicide risk questions reported significantly younger ages \( \chi^2 [1, n = 528] = 20.6, p = .002 \), less White, non-Hispanic race \( \chi^2 [2, n = 517] = 33.1, p = .001 \), more Hispanic ethnicity \( \chi^2 [2, n = 517] = 33.1, p = .001 \), were less likely to be retired \( \chi^2 [3, n = 524] = 17.5, p = .024 \), were more likely to be renters \( \chi^2 [1, n = 523] = 16.3, p = .008 \), and made less than $35,000 per year \( \chi^2 [1, n = 419] = 17.1, p = .018 \) as compared to those responding to suicide risk questions.

Table 5.2 displays weighted estimates of sociodemographic characteristics, suicide risk status and suicide risk question nonresponse. Results of the second chi square comparison tests revealed persons not responding to the suicide risk questions were more likely to report being from other races, non-Hispanic \( \chi^2 [1, n = 154] = 6.68, p = .025 \) than persons at risk for suicide. There were no other significant differences between suicide risk questions nonresponse and those at risk for suicide among sociodemographic characteristics.

The results of the third set chi square comparisons displayed in Table 5.2 indicated that persons not responding to the suicide risk questions in contrast to those not
at risk for suicide were significantly younger ($\chi^2 [1, n = 479] = 19.4, p = .003$), less White, non-Hispanic race ($\chi^2 [1, n = 468] = 30.3, p = .001$), more likely to be of Hispanic ethnicity ($\chi^2 [1, n = 468] = 30.3, p = .001$), less likely to be retired ($\chi^2 [1, n = 475] = 27.3, p = .001$), more likely to be renters ($\chi^2 [1, n = 474] = 20.8, p = .002$), and more likely to be making less than $35,000 per year ($\chi^2 [1, n = 379] = 19.6, p = .008$).

The multivariate logistic regression model regressed significant bivariate correlates from the first chi square comparison tests of Hispanic, other race(s), non-Hispanic, and White, non-Hispanic onto suicide risk nonresponse. As can be seen from the regression results in Table 5.3, Hispanic ethnicity was significantly related to nonresponse on suicide risk questions ($B = 0.794$, OR = 2.2, $p < .019$) when controlling for all other variables.

**Discussion**

This study found that the sociodemographic characteristics of suicide risk persons who did not respond to the suicide risk questions were comparable to the characteristics of individuals identified as being at risk for suicide in a population-based telephone survey. As such, these study findings provide further evidence to support the prior finding in college students that suicide risk question nonresponse appears to represent a group at risk for suicide (Podlogar, et al., 2016). Furthermore, suicide risk question nonresponse revealed significant differences across multiple sociodemographic characteristics compared to those not at risk for suicide. These differences are similar to those observed in other studies indicating that those not responding to suicide questions
Table 5.1. Prevalence estimates of suicide risk question response and non-response by sociodemographic characteristics, Monroe County Florida BRFSS 2016.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Monroe County</th>
<th>Suicide Risk Nonresponse</th>
<th>Suicide Risk Response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. In Sample</td>
<td>%a (95% CI)</td>
<td>No. In Sample</td>
</tr>
<tr>
<td>Overall (weighted)</td>
<td>528 (65,412)</td>
<td>109 (21,203) 32.4 26.5-38.4</td>
<td>419 (44,209)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>244</td>
<td>57 61.5 50.5-72.4</td>
<td>187</td>
</tr>
<tr>
<td>Female</td>
<td>283</td>
<td>51 38.5 27.6-49.5</td>
<td>232</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-44</td>
<td>79</td>
<td>31 39.9 28.8-51.0</td>
<td>48</td>
</tr>
<tr>
<td>&gt; 45</td>
<td>449</td>
<td>78 60.1 49.0-71.2</td>
<td>371</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>405 70.15</td>
<td>60 53.3 41.8-62.8</td>
<td>345</td>
</tr>
<tr>
<td>Other race(s), non-Hispanic</td>
<td>27 7.48</td>
<td>10 12.5 5.1-19.9</td>
<td>17</td>
</tr>
<tr>
<td>Hispanic</td>
<td>85</td>
<td>35 34.2 23.3-45.1</td>
<td>50</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No High School</td>
<td>40</td>
<td>17 18.7 9.8-27.7</td>
<td>23</td>
</tr>
<tr>
<td>High School</td>
<td>132</td>
<td>28 26.2 15.9-36.6</td>
<td>104</td>
</tr>
<tr>
<td>Attended College</td>
<td>131 24.48</td>
<td>25 23.9 14.3-33.4</td>
<td>106</td>
</tr>
<tr>
<td>College Grad</td>
<td>224</td>
<td>38 31.2 20.9-41.5</td>
<td>186</td>
</tr>
</tbody>
</table>
Table 5.1. Continued.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Monroe County No. In Sample</th>
<th>Monroe County %a (95% CI)</th>
<th>Suicide Risk Nonresponse No. In Sample</th>
<th>Suicide Risk Nonresponse %a (95% CI)</th>
<th>Suicide Risk Response No. In Sample</th>
<th>Suicide Risk Response %a (95% CI)</th>
<th>Pb</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Employment Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>261</td>
<td>64.56 (58.87-70.25)</td>
<td>66</td>
<td>68.0 (58.4-79.6)</td>
<td>195</td>
<td>62.4 (55.7-69.1)</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>31</td>
<td>5.43 (3.26-7.60)</td>
<td>7</td>
<td>5.8 (0.8-10.9)</td>
<td>24</td>
<td>5.3 (3.2-7.3)</td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td>200</td>
<td>22.24 (17.46-27.02)</td>
<td>24</td>
<td>12.9 (6.2-19.5)</td>
<td>176</td>
<td>26.8 (20.6-33.0)</td>
<td></td>
</tr>
<tr>
<td>Unable to work</td>
<td>32</td>
<td>7.77 (4.15-11.39)</td>
<td>10</td>
<td>12.3 (3.6-21.1)</td>
<td>22</td>
<td>5.6 (2.6-8.6)</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Housing Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own</td>
<td>370</td>
<td>55.11 (49.16-61.05)</td>
<td>57</td>
<td>42.2 (30.8-53.6)</td>
<td>313</td>
<td>61.1 (54.0-68.2)</td>
<td></td>
</tr>
<tr>
<td>Rent/other</td>
<td>153</td>
<td>44.89 (38.95-50.84)</td>
<td>48</td>
<td>57.8 (46.4-69.2)</td>
<td>105</td>
<td>38.9 (31.8-46.0)</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;$35,000</td>
<td>139</td>
<td>41.43 (34.64-48.21)</td>
<td>39</td>
<td>56.6 (43.5-69.8)</td>
<td>100</td>
<td>34.9 (27.3-42.6)</td>
<td></td>
</tr>
<tr>
<td>$35,000 to &lt;$75,000</td>
<td>122</td>
<td>31.15 (24.56-37.75)</td>
<td>21</td>
<td>22.4 (12.1-32.6)</td>
<td>101</td>
<td>34.9 (26.9-42.9)</td>
<td></td>
</tr>
<tr>
<td>$75,000 or more</td>
<td>158</td>
<td>27.42 (21.29-33.55)</td>
<td>18</td>
<td>21.0 (9.4-32.6)</td>
<td>140</td>
<td>30.2 (23.2-37.2)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

a Percentages weighted to population.

b Chi Square differences between general population and suicide risk response.
Table 5.2. Prevalence estimates of suicide risk and suicide risk question nonresponse by socio-demographic characteristics, Monroe County Florida BRFSS 2016.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Suicide Risk</th>
<th>Suicide Risk Question</th>
<th>No Suicide Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. In Sample</td>
<td>%a (95% CI)</td>
<td>p b</td>
</tr>
<tr>
<td>Overall (weighted)</td>
<td>49 (4,802)</td>
<td>7.3 (4.3-10.4)</td>
<td>.</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>22</td>
<td>41.7 (20.1-63.3)</td>
<td>.11</td>
</tr>
<tr>
<td>Female</td>
<td>27</td>
<td>58.3 (36.7-79.9)</td>
<td>.11</td>
</tr>
<tr>
<td>Age Group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-44 (yrs)</td>
<td>6</td>
<td>21.8 (4.0-39.6)</td>
<td>.12</td>
</tr>
<tr>
<td>&gt; 45 (yrs)</td>
<td>43</td>
<td>78.2 (60.4-96.0)</td>
<td>.12</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White, non-Hispanic</td>
<td>40</td>
<td>78.8 (61.4-96.2)</td>
<td>.03</td>
</tr>
<tr>
<td>Other race(s), non-Hispanic</td>
<td>4</td>
<td>2.6 (0.0-5.6)</td>
<td>.03</td>
</tr>
<tr>
<td>Hispanic</td>
<td>5</td>
<td>18.6 (13.3-35.8)</td>
<td>.11</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not graduate</td>
<td>2</td>
<td>0.6 (0.0-1.4)</td>
<td>.11</td>
</tr>
<tr>
<td>High School</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduated High School</td>
<td>13</td>
<td>34.3 (13.4-55.3)</td>
<td>.11</td>
</tr>
<tr>
<td>Attended College</td>
<td>12</td>
<td>30.2 (9.5-50.8)</td>
<td>.11</td>
</tr>
<tr>
<td>Graduated College</td>
<td>22</td>
<td>34.9 (14.9-55.0)</td>
<td>.11</td>
</tr>
</tbody>
</table>
Table 5.2 Continued.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Suicide Risk</th>
<th>Suicide Risk Question Nonresponse</th>
<th>No Suicide Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. In Sample</td>
<td>% (95% CI)</td>
<td>p</td>
</tr>
<tr>
<td>Employment Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>20</td>
<td>49.3</td>
<td>27.5-71.1</td>
</tr>
<tr>
<td>Unemployed</td>
<td>4</td>
<td>2.9</td>
<td>0.0-6.2</td>
</tr>
<tr>
<td>Retired</td>
<td>17</td>
<td>18.9</td>
<td>2.6-35.3</td>
</tr>
<tr>
<td>Unable to work</td>
<td>8</td>
<td>28.8</td>
<td>13.3-51.6</td>
</tr>
<tr>
<td>Housing Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Own</td>
<td>30</td>
<td>36.5</td>
<td>16.5-56.5</td>
</tr>
<tr>
<td>Rent/other</td>
<td>19</td>
<td>63.5</td>
<td>43.5-83.5</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; $35,000</td>
<td>19</td>
<td>54.1</td>
<td>29.4-78.9</td>
</tr>
<tr>
<td>$35,000 to &lt; $75,000</td>
<td>7</td>
<td>11.4</td>
<td>0.0-27.4</td>
</tr>
<tr>
<td>$75,000 or more</td>
<td>14</td>
<td>34.4</td>
<td>11.5-57.4</td>
</tr>
</tbody>
</table>

a Percentages weighted to population.
b Chi square between suicide risk and suicide risk question nonresponse.
c Chi square between no suicide risk and suicide risk question nonresponse.
Table 5.3. Adjusted Odds Ratios of Race and Ethnicity Responses to Suicide Risk Questions, Monroe County Florida BRFSS 2016.

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Suicide Risk Question Nonresponse</th>
<th>AOR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>White, non-Hispanic (Ref)</td>
<td></td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Other race(s), non-Hispanic</td>
<td></td>
<td>2.5</td>
<td>0.91-7.17</td>
</tr>
<tr>
<td>Hispanic</td>
<td></td>
<td>2.2</td>
<td>1.14-4.39</td>
</tr>
</tbody>
</table>

Note. AOR = adjusted odds ratio; CI = confidence interval. The analysis controlled for age, housing status, and employment.

represent a more vulnerable population of lower socio-economic status (Boström, et al., 1993; Jacobsen, & Thelle, 1988; Rodes, et al., 1990; Van Loon, Tijhuis, Picavet, Surtees, & Ormel, 2003). As a result, these differences should be accounted for analytically to reduce the impact of nonresponse bias on estimates of suicide risk.

Most notably, Hispanics were more likely to not respond to suicide risk questions than non-Hispanics, even when controlling for all other socioeconomic differences. Therefore, suicide risk nonresponse was associated with factors related to race and ethnicity. The findings of this study suggest that population-based health surveys may not be providing a complete picture of the sociodemographic characteristics associated with suicide risk, especially among vulnerable populations and Hispanics.

Of primary concern is that individuals choosing not to disclose information in response to psychosocial questions may be at a higher risk for suicide. For example, Svensson’s (2014) study of psychosocial survey nonresponse in a national population-based prospective of Japanese adults found associations between psychosocial question nonresponse and an increased risk of dying by suicide. Therefore, the results of this study may represent one part of a larger pattern of mental health question nonresponse that
could be occurring nationally as well as internationally. This highlights the need to learn
more about nonresponse to other psychosocial items and how nonresponse relates to an
increased risk of dying by, as well as being at risk for, suicide.

A strength of this study is that the data are representative of a general population,
not a clinic based sample. An additional study strength is that the measure of suicide risk
used in this study (the SBQ-R) has been recommended for use in population-based
studies as an effective and feasible measure of suicide risk (Burless & De Leo, 2001).
The SBQ-R has undergone psychometric testing and was found to have good sensitivity
and reliability in differentiating those at risk for suicide based on medical diagnosis and
Beck Hopelessness Scale scores among both adolescent and adult clinical and non-
clinical study samples (Osman et al., 2001).

This study has several implications for research and practice. Suicide risk
question nonresponse in this study appears to be an indicator of suicide risk. This is
concerning because those more at risk for suicide engage in less help-seeking behaviors
(Apter, Horesh, Gothelf, Graffi, & Lepkifker, 2001; Deane, Wilson, & Ciarrochi, 2001;
Podlogar, et al., 2016). These findings suggest the importance of further evaluating those
not responding to suicide risk questions in research and practice settings. Additionally,
suicide risk nonresponse can be decreased by the use of probing questions (e.g. “to what
extent?”, “tell me more?”, “you never felt this way?”) (Plöderl, Kralovec, Yazdi, &
Fartacek, 2011). Hence, the use of probing questions by researchers and clinicians may
improve identification of those at risk for suicide (Plöderl, Kralovec, Yazdi, & Fartacek,
2011). For example, mental health providers could consider incorporating the use of
probing questions into practice as an additional way to identify those displaying signs and symptoms of suicide risk, and choosing to not respond to standard assessment questions.

Attitudes and stigma have been identified as barriers to help seeking for those at risk for suicide with stigma serving as both a barrier for help seeking, and a risk factor for suicide (Reynders, Kerkhof, Molenberghs, & Van Audenhove, 2014). Given this, sensitivity training for all employees of mental health organizations beyond the providers, such as receptionists who are often the first encounter of those seeking help in a facility, could create a more open environment where those at risk for suicide would feel safe to disclose risk factors. Additionally, administering suicide risk questions in a more private environment, instead of waiting rooms where such questions are grouped into intake forms, could lead to more open and honest responses from those seeking help (Goyder & Leiper, 1985; Singer, & Presser, 2008).

This study has several implications for research. Overall, those identifying as Hispanic are an underrepresented sample in many population-based surveys (Keeter, Kennedy, Dimock, Best, & Craighill, 2006), and suicide risk question item nonresponse further compounds the problem of capturing an accurate representation of population-based suicide risk for Hispanics. Future research should investigate whether suicide risk question nonresponse among Hispanics is related to English language ability, translation, or cultural aspects (Kim & Fredriksen-Goldsen, 2013).

The findings of ethnic disparities in suicide risk question nonresponse in this study suggest a need for more targeted follow-up or alternative research methods for assessing suicide risk (Klein et al., 2011). Some individuals may not understand the purpose for assessing population-based suicide risk and may believe that adverse
consequences, such as involuntary hospitalization, may occur if suicidal thoughts are disclosed (Cigularov, Chen, Thurber, & Stallones, 2008). Therefore, alternative research methods such as online surveys should be explored to determine the possibility of reduced nonresponse for suicide risk questions through the use of different data collection methods (Michaels, Chu, Silva, Schulman, & Joiner, 2015).

This study has some limitations. The findings are based on survey data for one county. Hence it is important to replicate these findings with other county-level, state or national population-based survey data. However, these findings highlight the need to improve population-based measurement of suicide risk to reduce racial and ethnic bias (Kim & Fredriksen-Goldsen, 2013). Additionally, measures of religion and attitudes about mental health were not included in the survey. Thus it is not possible to assess the influence of religion or stigmatizing beliefs on non-response. The inclusion of such measures when assessing suicide risk is important for future research.

Monroe County data offered an opportunity to explore suicide risk question nonresponse that may be occurring at a national and international level in other data sets. As such these findings suggest that it may be important to investigate selective suicide risk question nonresponse in other population-based data. Future research should also explore other selective psychosocial question nonresponse for suicidality, and suicide risk question nonresponse when assessing population-based suicide risk profiles.
Chapter 6
Recommendations for Research, Practice and Policy
The three papers within this dissertation clarified the phenomenon of completed suicides to better inform risk assessments, and enhanced understanding of the context surrounding suicide risk occurring in a local community experiencing high suicide rates. The findings of this dissertation support the adaptation of the Commission on Social Determinants of Health (CSDH) Conceptual Model that guided the analysis of this study (WHO, 2010). As such, this dissertation can inform suicide research, practice, and policy guiding prevention activities.

The concept analysis of suicide lethality conducted in this study clarified how current definitions of suicidality and approaches for estimating suicide risk may not accurately identify some individuals at risk for completing suicide. This analysis supports suicide research and assessment incorporating more of the correlates of completed suicide, such as acute alcohol or drug abuse in relation to an acute psychological stressor, social isolation, and knowledge and access to lethal means particularly among Caucasian men of advanced age (Conner, 2004; Elnour & Harrison, 2008; Hamdi et al., 1991; Hall, Platt, & Hall, 1999; Linehan, 1986; Peterson et al., 1985). Researchers and practitioners may be able to better identify individuals more proximal to the outcome of completed suicide by incorporating the correlates of completed suicide, along with the phenomena typically assessed in more common suicide risk assessment practices (e.g., ideation, attempts, plan) (Kar, et al, 2014; Plutchik, Van Praag, Picard, Conte, & Korn, 1989; Potter, et al., 1998; Sun, 2011; Smith, Conroy, & Ehler, 1984; Weisman & Worden, 1972). Doing so would enhance understanding of the complex interrelationships among these various factors, advance the science of suicidology, and lead to the development of more effective suicide interventions.
A potential barrier to the development of effective suicide interventions is that population-based suicide risk profiles may not provide an accurate depiction of those at risk, due to issues of selective nonresponse. This dissertation found that Hispanics were more likely to not respond to suicide risk questions than any other race or ethnicity, which suggests that population-based estimates of suicide risk among more hard to reach, vulnerable populations, such as Hispanics, may not be accurate. Future research should investigate selective non-response to suicide risk questions in other, larger State and National data sets, such as in the Substance Abuse and Mental Health Services Administration’s (SAMHSA) National Survey for Drug Use and Health, to see if similar findings are present. Meanwhile, nurses should work to reduce mental health associated stigma that may cause selective non-response to suicide risk questions, particularly among different cultural or vulnerable groups such as Hispanics.

These study findings suggest that socioeconomic status (SES) should be considered as an important social determinant that may contribute to suicide risk. Consistent with other European epidemiological studies (Lewis & Sloggett, 1998; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005), housing status was found to be associated with suicide risk in Monroe County, Florida. However, what needs to be further clarified is what housing in association with suicide risk represents. Housing status could be viewed as a measure of wealth that may be indirectly tied to health care access through a link to employment status and type of occupation. For example, Lewis and Sloggett (1998) assessed suicide and various measures of SES using longitudinal data, and concluded that unemployment, no access to a car and renting a home increased the risk of suicide (Lewis & Sloggett, 1998). These three measures serve as proxies for
socioeconomic status, and could be capturing the stability associated with wealth and social networks that contributes to individual resiliency. If so, resiliency could be the driving factors behind the relationship between SES and suicide risk. More research is needed to investigate these relationships. Future studies investigating population-based suicide risk should also assess housing status as an indicator of SES, in addition to more common indicators such as income, education and employment.

Nevertheless, the phenomenon of suicide would be better understood if research progressed beyond the exploration of whether context matters to address how context matters in suicide risk (Denney, Wadsworth, Rogers, & Pampel, 2015). A strength of the adaptation of the World Health Organization (WHO) (2017) Commission on Social Determinants of Health (CSDH) Conceptual Model used to guide this study analyses is the integration of the socio-economic political context at a macro level. Unfortunately, the integration of such macro level data into the statistical analysis of this dissertation was beyond the scope of this study. Future examination of suicide risk issues should consider multidimensional research designs that analyze macro-level measures such as suicide rates concurrently with individual-level measures such as suicide risk. By continuing to explore the relationship between SES and suicide risk through the use of multidimensional measures, a better understanding of how social context and wealth contribute to the disparities associated with suicide.

Whatever the status of renting a home may represent in relation to suicide risk, the findings of this dissertation, along with those from population-based international studies identifying an association between housing status and suicide risk (Lewis & Sloggett, 1998; Lorant, Kunst, Huisman, Costa, & Mackenbach, 2005), suggest that
working towards affordable housing policies may be beneficial. The creation of affordable housing within areas that are experiencing wealth disparities could help lessen the burden of economic stress contributing to adverse health outcomes and health disparities such as a high suicide risk within those populations. Additionally, public health and mental health nurses should consider assessing the housing and socioeconomic status of clients as part of suicide risk screening.

Study findings also suggest that increasing access to mental health care among lower socioeconomic groups may eliminate some risk, as unmanaged mental illness (as represented by more than 14 or more mentally unhealthy days per month) was strongly associated with suicide risk. These findings are also consistent with other findings in the literature regarding the relationship between suicide and poor mental health (Yoshimasu, Kiyohara, & Miyashita, 2008). Hence, nurses need to promote policies that improve mental health coverage in low-cost healthcare plans, and advocate for an increased number of mental health treatment facilities so that more of the individuals who need these services can receive them. Additionally, advocating for depression and suicide risk screening in primary care settings could help identify individuals at risk for suicide, but unable to access mental health services.

Moreover, translating the findings of this dissertation into the development of preventative nursing screening practices could help reduce the incidence of suicide. Current screening practices need to be updated to include assessment of correlates associated with completed suicide. For example, based on the conceptual analysis of suicide lethality, assessment questions are to needed to capture acute interpersonal conflict coupled with ineffective coping that can serve as a triggering event (DeBastiani
& De Santis, 2017). Additionally, conducting suicide risk screening assessments in-person, instead of incorporating assessment into intake forms, would allow for the use of probing questions. Probing questions (e.g. “to what extent?”, “tell me more?”, “you never felt this way?”) may lead to more accurate responses by individuals at risk for suicide, and decrease nonresponse issues associated with those hesitant to disclose suicide risk.

In conclusion, clearly more work in terms of practice, research, and policy is needed to address this significant population health problem. Nurse researchers need to lobby for more investment in suicide research. Additionally, nurses must continue to work to ensure that adequate mental health content is included in both undergraduate and graduate nursing programs. This increased mental health content, including more education regarding suicide risk assessment, will ensure that all levels of graduates from nursing programs are equipped with the knowledge and skills needed to address the mental health needs of vulnerable populations.
References


Conner, K.R. (2004). A call for research on planned vs. unplanned suicidal behavior. *Suicide and Life-threatenng Behavior,* 34(7), 89-98. doi: 10.1521/suli.34.2.89.32780


Appendices

Appendix A. IRB Exempt Status

Purpose:
Projects that do not meet the federal definition of research pursuant to 45 CFR 46 do not require IRB review. This tool was developed by the HS-IRBs to assist the University of Miami community in determining when a project falls outside of the IRB’s purview.

Principal investigator Name:
(last name, first name)
DeBastiani, Summer

Project Title:
(Please limit to 150 characters)
A Population-based Assessment of Suicide Risk

Brief Description of Project/Goals:
(2-3 sentences)
To estimate the 2016 population-based prevalence of suicide risk in Monroe County and associated sociodemographic characteristics using BRFSS data.

School/College/Center through which the project will be conducted:
Nursing and Health Studies, School of

Will the project involve evaluating the safety or effectiveness of any of the following:
- Drugs for human use
- Medical devices for human use
- Biological products for human use
- Foods or dietary supplements that include a nutrient content claim or a health claim
- Infant formulas
- Food and color additives
- ☐ Yes
- ☐ No

Will you, a member of your research team or a collaborator observe, interact with, or intervene with individuals to gather information that will be used for research? Examples:
- Surveys, questionnaires, focus groups, interviews
- Games experiments in physical or in electronic environments
- Physical or biomedical procedures (imaging, scanning, blood collection, anthropomorphic procedures)
- Diet, nutrition studies, taste tests
- Studies examining effectiveness of educational tools or curricula
Use of instruments or devices, including phones, to collect data or monitor or influence behavior
Passive observation of public behavior (in physical or online environments, including social media)
Studies examining individuals' responses to manipulation of their physical or online environment
Another activity that involves observation of, or interaction with, individuals to gather information for research

☐ Yes
☐ No, project will use only existing data or specimens

Are the data/specimens about or from individuals who are or may still be living?

☐ Yes
☐ No, data is about deceased individuals, or materials are from cadavers.

☐ Yes, data is publically available.
☐ No

Were/will the data/specimens (be) collected specifically for the currently proposed research project through an interaction or intervention with living individuals?

☐ Yes
☐ No

Can the provider link the data/specimens, directly or indirectly, to identifiable living individuals?

☐ Yes
☐ No, data is de-identified.

Project is Not Human Subject Research. No application to the IRB office needed.
Contact the HSRO@miami.edu or 305-243-3193 if acquiring the data requires a Data Use Agreement or Materials Transfer Agreement between the provider and recipient.

Please feel free to print the completed form as certification if the project is "not research" and does not require IRB review. Please note that the UMI Human Subject Research Office does not maintain copies of your responses.

Continue to HSRO website
Appendix B. SBQ-R Questions

The next four questions ask about your risk for possible suicide. Monroe County has the highest suicide rate in the state of Florida. To be able to develop helpful suicide interventions, we need to understand how many people in our county are at risk. Although this is a sensitive topic, we ask that you answer the following questions to the best of your ability. We also want to assure you again that the answers to these questions are completely confidential.

(Item 1) Have you ever thought about or attempted to kill yourself? (check one only)

1. Never
2. It was just a brief passing thought
3. I have had a plan at least once to kill myself but did not try to do it
4. I have had a plan at least once to kill myself and really wanted to die
5. I have attempted to kill myself, but did not want to die
6. I have attempted to kill myself, and really want to die
7. Don’t know/ Not sure
9. Refused

(Item 3) Have you ever told someone that you were going to commit suicide or that you might do it?

1. No
2. Yes, at one time, but did not want to do it
3. Yes, at one time, and really wanted to do it
4. Yes, more than once, but did not want to do it
5. Yes, more than once, and really wanted to do it
7. Don’t know/Not sure
9. Refused
(Item 4) How likely is it that you will attempt suicide someday?

1. Never
2. No chance at all
3. Rather unlikely
4. Unlikely
5. Likely
6. Rather likely
7. Very likely
77. Don’t know/Not sure
99. Refused
Appendix C. Sociodemographic Characteristics and Socioeconomic Structural Determinants

Are you …

1 Male
2 Female
9 Refused

What is your age?

___ Code age in years
0 7 Don’t know / Not sure
0 9 Refused

Are you Hispanic, Latino/a, or Spanish origin?

If yes, ask: Are you…

1 Mexican, Mexican American, Chicano/a
2 Puerto Rican
3 Cuban
4 Another Hispanic, Latino/a, or Spanish origin

Do not read:

5 No
7 Don’t know / Not sure
9 Refused

Which one or more of the following would you say is your race?

Please read:

10 White
20 Black or African American
30 American Indian or Alaska Native
40 Asian
41 Asian Indian
42 Chinese
43 Filipino
44 Japanese
45 Korean
46 Vietnamese
47 Other Asian
50 Pacific Islander
51 Native Hawaiian
52 Guamanian or Chamorro
53 Samoan
54 Other Pacific Islander
Do not read:
60 Other
88 No additional choices
77 Don’t know / Not sure
99 Refused

Are you…?

Please read:
1 Married
2 Divorced
3 Widowed
4 Separated
5 Never married

Or
6 A member of an unmarried couple

Do not read:
9 Refused

What is the highest grade or year of school you completed?

Read only if necessary:
1 Never attended school or only attended kindergarten
2 Grades 1 through 8 (Elementary)
3 Grades 9 through 11 (Some high school)
4 Grade 12 or GED (High school graduate)
5 College 1 year to 3 years (Some college or technical school)
6 College 4 years or more (College graduate)

Do not read:
9 Refused

Do you own or rent your home?
1 Own
2 Rent
3 Other arrangement
7 Don’t know / Not sure
9 Refused

INTERVIEWER NOTE: “Other arrangement” may include group home, staying with friends or family without paying rent.

NOTE: Home is defined as the place where you live most of the time/the majority of the year.
Are you currently…?

INTERVIEWER NOTE: If more than one, select the category which best describes you.

Please read:
1. Employed for wages
2. Self-employed
3. Out of work for 1 year or more
4. Out of work for less than 1 year
5. A Homemaker
6. A Student
7. Retired

Or
8. Unable to work

Do not read:
9. Refused

Is your annual household income from all sources—

If respondent refuses at ANY income level, code ‘99’ (Refused)

Read only if necessary:
0 4 Less than $25,000   If “no,” ask 05; if “yes,” ask 03
   ($20,000 to less than $25,000)
0 3 Less than $20,000   If “no,” code 04; if “yes,” ask 02
   ($15,000 to less than $20,000)
0 2 Less than $15,000   If “no,” code 03; if “yes,” ask 01
   ($10,000 to less than $15,000)
0 1 Less than $10,000   If “no,” code 02
0 5 Less than $35,000   If “no,” ask 06
   ($25,000 to less than $35,000)
0 6 Less than $50,000   If “no,” ask 07
   ($35,000 to less than $50,000)
0 7 Less than $75,000   If “no,” code 08
   ($50,000 to less than $75,000)
0 8 $75,000 or more

Do not read:
7 7 Don’t know / Not sure
9 9 Refused
Appendix D. Psychosocial Intermediary Determinants

Has a doctor, nurse, or other health professional EVER told you that you had any of the following? For each, tell me “Yes,” “No,” or you’re “Not sure.”

(Ever told) you have a depressive disorder (including depression, major depression, dysthymia, or minor depression)?

1 Yes
2 No
7 Don’t know / Not sure
9 Refused

Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?

Number of days
8 8 None [If Q2.1 and Q2.2 = 88 (None), go to next section]
7 7 Don’t know / Not sure
9 9 Refused
Appendix E. Behavioral and Physical Intermediary Determinants

During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?

1. Yes
2. No
7. Don’t know / Not sure
9. Refused

Would you say that in general your health is:

1. Excellent
2. Very good
3. Good
4. Fair
5. Poor
7. Don’t know/Not Sure
9. Refused

During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?

_ _ Number of days*
8 8 None
7 7 Don’t know / Not sure
9 9 Refused

*Question dichotomized into yes/no activity limitation due to health (1 day or more = yes, activity limitation due to health; 0 days = no activity limitation due to health).

Considering all types of alcoholic beverages, how many times during the past 30 days did you have \( X \) [\textit{CATI } X = 5 \textit{ for men, } X = 4 \textit{ for women}] or more drinks on an occasion?

_ _ Number of times
8 8 None
7 7 Don’t know / Not sure
9 9 Refused
During the past 30 days, how many times have you driven when you’ve had perhaps too much to drink?

<table>
<thead>
<tr>
<th>Number of times</th>
<th>8 8</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Don’t know / Not sure</td>
<td>7 7</td>
<td></td>
</tr>
<tr>
<td>Refused</td>
<td>9 9</td>
<td></td>
</tr>
</tbody>
</table>
Appendix G. Health Care Access Questions

Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, government plans such as Medicare, or Indian Health Service?

1 Yes [If using Health Care Access (HCA) Module go to Module 4, Q1, else continue]
2 No
7 Don’t know / Not sure
9 Refused

Was there a time in the past 12 months when you needed to see a doctor but could not because of cost?

1 Yes
2 No
7 Don’t know / Not sure
9 Refused