Suicide in the Maltese Islands between 1995 and 2018

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Author Note

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Declaration of Authenticity

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Dedication

To A.

May you find the strength and support to carry on

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Abstract

According to the World Health Organization (WHO, 2018), one person dies by suicide every 40 seconds. Research on suicide is of critical importance for effective suicide prevention, however it is lacking in the local context. This study investigated the prevalence and the characteristics of the individuals who died by suicide in the Maltese Islands between 1995 and 2018. The research questions addressed the demographic, suicide-related, psychiatric, adverse life events and other variables pertaining to the individuals in the study. Data were collected from Felice et al. (2014)'s study, post-mortem records, the National Mortality Register, and the medical records from Mount Carmel Hospital and Mater Dei Hospital. A quantitative methodology was used to carry out secondary data analysis. Statistical tests were used to analyse trends and relationships between selected variables. The total number of suicides in this study was 635 individuals. An increasing suicide trend was found over the study's 24-year period. The most salient findings included the heightened suicide risk for males, individuals aged 30 to 49, single or separated individuals, and unemployed or pensioners. Hanging was the most commonly used suicide method. These findings started addressing the research gap in the Maltese Islands and broadening the understanding of suicide in the local context. The identification of at-risk groups and commonly used suicide methods provides important implications for suicide prevention efforts. Conclusively, this study highlights the complexity of suicide and makes recommendations for future research, policy, and practice, at multiple levels, in order to address this public health priority.

Keywords: suicide, Maltese Islands, prevalence, demographic, psychiatric, adverse life events

Table of Contents

Introduction....11
Preamble....11
Rationale....12
Aims of the Study....13
Research Questions....13
Terminology and Definitions....14
Theoretical Frameworks....15
Contextual Framework....19
Overview of Chapters....21
Literature Review....22
Introduction....22
Evaluating Suicide Data....22
Classification of Suicidal Behavior....24
Epidemiology....25
Risk Factors....26
Protective Factors....38
Cultural Implications....39
Local Scenario....40
Prevention, Assessment, and Intervention....41
Conclusion....43
Method....44
Introduction....44
Research Questions....44
Research Paradigm....46
Research Design....47
Data Collection Tool....47
Population....47
Data Sources....48
Procedure....49
Data Analysis....56
Additional Correspondence and Meetings....59
Reliability and Validity....60
Ethical Considerations....61
Conclusion....62

Results....63
Introduction....63
Preliminary Considerations....63
Prevalence of Suicide....68
Univariate Analyses....68
Bivariate Analyses....83
Conclusion....90
Discussion....91
Introduction....91
Prevalence of Suicide....91
Demographic Variables....93
Suicide-related Variables....102
Psychiatric Variables....107
Adverse Life Events and Other Variables....112
Conclusion....112
Conclusion....114
Introduction....114
Summary of the Main Findings....114
Limitations of the Study....115
Recommendations for Future Research....116
Implications for Policy and Practice....118
Conclusion....120
References....121
Appendix A....158
Appendix B....160
Appendix C....161
Appendix D....162
Appendix E....167
Appendix F....168
Appendix G....170
Appendix H....173
Appendix I....174
Appendix J....179
Appendix K....180
Appendix L....181

Appendix M 182

List of Tables and Figures

Tables

Table 1. Terminology and definitions....15
Table 2. Overview of local services....20
Table 3. Overview of variables....45
Table 4. Sources of data....48
Table 5. Variables' classification systems....57
Table 6. Missing data....64
Table 7. Available data....65
Table 8. Occupation....72
Table 9. Location of suicide....75
Table 10. Suicide hotspot locations....77
Table 11. Suicide method....77
Table 12. Type of mental illness....79
Table 13. Type of psychiatric service....80
Table 14. Time since last contact with services....80
Table 15. Method of prior suicide attempts....81
Table 16. Adverse life events and other variables....82
Table 17. Gender and marital status crosstabulation....84

Figures

Figure 1. Data collection procedure. 50
Figure 2. Graphical illustration of the Maltese Islands by LAU classification. 58
Figure 3. Age histogram. 69
Figure 4. Birth cohort bar graph. 70
Figure 5. Residence map. 71
Figure 6. Year of suicide scatterplot. 73
Figure 7. Month of suicide bar graph. 73
Figure 8. Time of suicide bar graph. 74
Figure 9. Locality of suicide map. 76
Figure 10. Gender and age box plots. 83
Figure 11. Gender and suicide method clustered bar graph. 85
Figure 12. Age and suicide method box plots 86
Figure 13. Year of suicide and gender scatterplot. 88
Figure 14. Year of suicide and age scatterplot. 89
Figure 15. Year of suicide and hanging method scatterplot. 90

Introduction

Preamble

According to the World Health Organization (WHO, 2018), approximately 800,000 people die by suicide each year worldwide, or one person every 40 seconds. This makes suicide the second leading cause of death among 15 to 29-year-olds, and the eighteenth leading cause of death across age, worldwide.

The WHO (2014) recognizes suicide as a high public health priority. Its Mental Health Action Plan has highlighted the importance of strengthening information systems and research in order to improve mental health policy and legislation, as well as to implement strategies for suicide prevention (WHO, 2013a).

The National Institute for Health and Care Excellence's (NICE, 2016b) guidelines in the United Kingdom outlined the importance of detailed suicide risk assessments including a range of biological, social, and psychological factors. Identifying correlates of suicidal behaviour has also been identified as a prioritized research agenda in the United States (National Action Alliance for Suicide Prevention, 2014).

Moreover, the impact of suicide is far wider. For every suicide, there is a significant impact on the people bereaved by suicide, including family members, friends, and clinicians (Parker, 2014). In addition, for every person who dies by suicide, many others attempt suicide (Bachmann, 2018; U.S. Department of Health and Human Services, 2012), with approximately 1.3 million attempted suicides in a given year, in the U.S. alone (Centres for Disease Control and Prevention [CDC], 2015).

Rationale

The prevalence, characteristics, and patterns of suicidal behaviour vary significantly across populations, demographic factors, and time (WHO, 2014). Therefore, regular monitoring and up-to-date information on suicidal behaviour is essential for suicide prevention. The NICE guidelines recommended collecting and analyzing local data on suicide, including the following variables: "method, location, timing, details of individual and local circumstances, demographics, occupation and characteristics" (NICE, 2018, p. 11).

However, in various countries, suicide remains stigmatized, and in some countries even illegal (WHO, 2014). Accurate data is therefore difficult to collect and remains limited, particularly in countries without the necessary registration systems in place. Suicide prevention requires an understanding of the limitations of the data available in that country, followed by efforts to improve its collection. Moreover, collaboration between researchers and policymakers is necessary to advance suicide prevention (Sareen et al., 2014).

While international research has started to address this need, such data collection remains very limited in the Maltese Islands. To my knowledge, and following consultation with various experts, to date, local research, including basic epidemiological data, is lacking in the area of suicide. Advancements in research are necessary for effective suicide prevention (National Action Alliance for Suicide Prevention, 2014; WHO, 2014). Therefore, this study aims to address this gap, by shedding light on suicide in the local context, and in turn informing research and policy in suicide prevention efforts.

Moreover, various studies have highlighted the importance of cultural translation in suicidology (Colucci, 2006; Goldston et al., 2008; Lester, 2008). Cultural factors related to suicide include cultural protective factors such as the role of religion, spirituality, and the family; cultural manifestations and interpretations of distress; as well as the impact of stigma

and culture on help-seeking behaviour. These cultural variations have considerable implications for suicide prevention and treatment (Goldston et al., 2008; Lester, 2008). Therefore, in gaining a better understanding of suicide, it is important to investigate the local scenario and the specific cultural factors that pertain to the Maltese context.

Felice et al. (2014) examined suicide trends and risk factors in Malta from 1995 to 2013. Although local suicide rates appear to be lower than the European average, there is a rising trend. Felice et al. (2014) found that groups at high risk of suicide in the local context included: middle aged men; persons with mental health problems; and persons with previous suicide attempts. However, further research is required in order to gain a more comprehensive up-to-date understanding of these preliminary findings.

Aims of the Study

This study aims to examine the epidemiological data of persons who died by suicide in the Maltese Islands, from 1995 to 2018. Moreover, it aims to identify trends and risk factors of suicide, specific to the local context and culture. Given that data on suicide are highly lacking in the local context, a quantitative methodology is chosen in order to first address these fundamental research questions, outlined below.

This study incorporates the data from Felice et al. (2014)'s study outlined above. In addition, this study gathers further data from 2014 to 2018. The variables investigated in this study include individuals' gender, age, marital status, nationality, residence, employment status, the time of year of suicide, location and method of suicide, mental and physical illnesses, substance abuse, previous suicide attempts, previous contact with mental health services, and adverse life events.

Research Questions

The research questions guiding this study are three-part and include the following:

1. What is the prevalence of suicide in the Maltese islands between 1995 and 2018?
2. What is the frequency of each of the abovementioned variables?
3. What are the gender differences, age differences, and trends over time for selected variables?

These research questions are addressed using secondary data analysis. Data are collected from Felice et al. (2014)'s study, post-mortem records, the National Mortality Register, and medical records. Various statistical analyses are carried out on the data, which will be elaborated in the Method and Results chapters.

Terminology and Definitions

The term *suicide* was coined by Sir Thomas Browne in 1642, meaning to kill oneself (as cited in Rousseau, 2000). Various definitions of suicide have since been proposed, and different terminology has been used to denote the phenomenon, often leading to inconsistencies in the field. Consistent nomenclature for suicide is important across the areas of public health, research, and clinical practice (De Leo, Burgis, Bertolote, Kerkhof, & Bille-Brahe, 2006).

The CDC proposed the following uniform definitions (Crosby, Ortega, & Melanson, 2011, p. 21). This classification system has been developed to address international inconsistencies and to improve the accuracy of identification, assessment, and intervention (Posner, Brodsky, Yershova, Buchanan, & Mann, 2014). Therefore, the terminology and definitions presented in Table 1 will be used throughout this study to denote, define, and differentiate amongst related but different phenomena.

Table 1

Terminology and definitions

Terminology	Subclassification	Definition
Self-directed violence	Non-suicidal Suicidal Undetermined	Behavior that is self-directed and deliberately results in injury or the potential for injury to oneself.
Suicide attempt		A non-fatal self-directed potentially injurious behavior with any intent to die as a result of the behavior.
Interrupted self-directed violence	By self By other	A person takes steps to injure self but is stopped by [self or] another person prior to fatal injury.
Other suicidal behavior including preparatory acts		Acts or preparation towards making a suicide attempt, but before potential for harm has begun. This can include anything beyond a verbalization or thought, such as assembling a method (e.g., buying a gun, collecting pills) or preparing for one's death by suicide (e.g., writing a suicide note, giving things away).
Suicide		Death caused by self-directed injurious behavior with any intent to die as a result of the behavior.

Note. Adapted from *Self-directed violence surveillance: Uniform definitions and recommended data elements,* by Crosby et al., (2011), Atlanta, GA: Centers for Disease Control and Prevention.

Theoretical Frameworks

Suicide has long been perceived as a seemingly paradoxical phenomenon, leading to fear, confusion, and misunderstanding (Selby, Joiner, & Ribeiro, 2014). In recent decades, the understanding of suicide has improved through increased research and the development of multiple theories. Nonetheless, the need for more theoretical models has been highlighted in order to better understand the complexity of suicide (Prinstein, 2008). An overview of the most prominent theoretical frameworks is presented in this section.

Biological theories. Various studies have contributed to a biological understanding of suicide, including genetic and neurobiological approaches. Family, twin and adoption studies have provided evidence for the presence of genetic factors in the transmission of suicidal behavior (Fiori, Ernst, & Turecki, 2014). Specific components associated with this transmission have also been identified, such as impulsive-aggressive traits (Kim et al., 2005). Furthermore, while psychopathology plays a role in this process, research indicates that the genetic factors involved in the transmission of suicidal behavior are distinct from those involved in the transmission of other psychiatric disorders (Egeland & Sussex, 1985).

In addition to genetics, studies have examined the role of neurotransmitter systems in suicidal behavior, including serotonin (Anguelova, Benkelfat, & Turecki, 2003) and catecholamines (Pandey & Dwivedi, 2007). Moreover, the stress-diathesis model has been used to understand the stressors and predisposing factors in suicide, such as the hypothalamic-pituitary-adrenal axis (Coryell & Schlesser, 2001), as well as the role of various other systems. Despite these advances in research, further research is required in order to provide an integrated theory of how biological systems interact in suicide risk (Fiori et al., 2014).

Cognitive theories. Beck's cognitive model of depression (1967) has described how negative self-schemas and cognitive biases maintain the cognitive triad of negative views about oneself, the world, and the future. Moreover, according to Beck (1963), hopelessness is one of the highest predictors of suicide, whereby individuals may regard suicide as the only way of dealing with insoluble problems and a future perceived as immutably bleak (Beck & Steer, 1989; Beck, Steer, Kovacs, & Garrison, 1985).

Other cognitive models of suicide have also been proposed. The cognitive distortions and deficits model of suicidality outlines how distortions, including hopelessness and

negative self-evaluations; and deficits, including problem-solving difficulties and cognitive rigidity, contribute to suicide (Fazakas-DeHoog, Rnic, & Dozois, 2017; Nichols & Fasko, 1988). Furthermore, the learned helplessness theory suggests that an external locus of control is linked to helplessness and depression (Seligman, 1987), which in turn contribute to suicidal behaviour (Peck, 1983).

In addition to these theories, the following cognitive content may also contribute to suicidal behavior: perfectionism, including both self-criticism and socially prescribed perfectionism (Beevers & Miller, 2004); an internal attributional style or a readiness to blame oneself (Peterson & Seligman, 1984); and unbearability, whereby suicide is perceived as an escape from intolerable psychological pain (Wenzel & Beck, 2008).

Psychodynamic theories. Freud's (1917) account of hostility turned inwards has provided the basis for a psychodynamic understanding of suicide. He described the death instinct, or an intrinsic pull towards self-annihilation, as overriding the self-preservation instinct. Since then, authors have outlined the importance of the suicide fantasy in the pre-suicidal state, in that it reflects the individual's relation to the self and the body; and it is the motivating force for suicide, whereby killing the body fulfills the fantasy (Ringel, 1976). Common fantasies include death as revenge or punishment (Haim as cited in Goldblatt, 2014).

Furthermore, suicide may be seen as a solution to unconscious internalized conflicts with the primary caregiver. Campbell and Hale (2017) described a core complex, in which the individual's body may become identified with the bad mother, and therefore become expendable. In an individual with this core complex, an act of perceived betrayal may drive the individual into a pre-suicidal state. A trigger may then lead to confusion and a failure of sophisticated ego defenses, which crosses the body barrier, and results in suicide.

Social theories. Durkheim (1952) maintained that social forces impact suicide rates because social relationships regulate individual behavior. He presented four types of suicide, each reflecting problematic patterns of social integration and moral regulation. While Durkheim's theory has since received significant criticism, it was one of the first influential studies on suicide and provided a useful shift in understanding suicide as a social, rather than a solely individual, phenomenon. Moreover, it has influenced current theories of suicide, such as Joiner's theory (2005) explored below.

Other models of suicide have also incorporated social aspects, including an interaction of multiple socio-cultural, developmental, and family environmental factors. Such theories include both stressors as risk factors, such as interpersonal conflict; as well as protective factors, such as strong family connections (Bridge, Goldstein, & Brent, 2006).

Comprehensive theories. While these theories all provide useful accounts of suicide, research indicates that suicide is multifactorial and must be understood in the context of interacting risk factors, rather than single factors in isolation (British Psychological Society [BPS], 2017; Maris, Berman, Maltsberger, 1992). The need for a theoretical framework which accounts for the diverse factors associated with suicide has been highlighted (Van Orden et al., 2010).

The interpersonal theory of suicide is a comprehensive framework that has been highly influential in informing the understanding of suicide. It is based on two constructs related to the desire to die, namely: thwarted belongingness and perceived burdensomeness; as well as a third construct: acquired capability (Joiner, 2005; Van Orden et al., 2010). Thwarted belongingness refers to the perception of alienation from other group members; while perceived burdensomeness refers to the perception of being a burden and having a negative effect on others. According to this theory, people engage in suicidal behavior when

they have the desire to die, as well as the capacity to enact the behavior. The latter is acquired by injurious experiences, such as self-directed violence, which erode the self-preservation instinct (Joiner, 2005).

Therefore, the main theoretical foundation for this study is the interpersonal theory of suicide (Joiner, 2005). Nonetheless, as outlined above, given the complex nature of suicide, the other approaches and theories described in this section are also employed in order to gain a holistic understanding of this dynamic and multifactorial process.

Contextual Framework

Some contextual background pertaining to the local scenario is provided in this section, in terms of the laws, acts and codes of conduct relating to suicide. It is beyond the scope of this study to delve into these aspects in depth, however it is useful to present them here in order to provide a context to the local approach to suicide. The Method chapter will provide detailed information on how suicides are recorded in the Maltese Islands.

Legal context. According to Maltese law, suicide is not illegal, however inciting or assisting someone with suicide is a criminal offence which may lead to imprisonment of up to twelve years (Criminal Code, Chapter 9, Article 213).

Service provision. A brief overview of the local services related to suicide is provided in Table 2. This information was drawn from a recent mapping exercise which outlined suicide support services available in the local context (S. Sammut Alessi, personal communication, May 21, 2019), amongst other sources of information.

Table 2

Overview of local services

Type	Service	Description
Crisis	Crisis service at MDH Accident and Emergency Department	Psychiatry liaison team offering individual support.
	CAPES at MDH Accident and Emergency Department	Emergency service for individuals under 18 years of age.
	Crisis Resolution Malta, NGO	24/7 psychiatric review, possibly at a charge.
Inpatient	Mount Carmel Hospital	Acute psychiatric wards with multidisciplinary teams.
	Psychiatric Unit at MDH	Acute psychiatric ward.
	Gozo General Hospital psychiatric services	Emergency, inpatient, and outpatient services.
Outpatient	Psychiatric Outpatients at MDH	Psychiatric service for new patients, recently discharged, or ongoing care.
	Suicide Prevention Outreach and Therapeutic services (SPOT), NGO	Supportive scheme for patients and their relatives.
	Community mental health services	Mental health care in various health centres and clinics.
Helplines	National Support Helpline (179), Appoġġ	Phone-call service offering referrals.
	Kellimni.com	24/7 chat-line offering referrals.
Other services	Victim Support Malta, SOS Malta, Appoġġ, Sedqa, Caritas, private services	Various other services not specific to suicide.

Mental Health Act. The local Mental Health Act states that if there is serious risk of physical harm to the individual, he or she may be admitted involuntarily to a licensed facility, and restrictive care may be provided. Such treatment must be provided "in the least restrictive manner" and specific procedures are outlined in this regard (Mental Health Act, 2012, p. 4).

Professional conduct. Furthermore, the Malta Psychology Profession Board's code of ethics and conduct outlines the circumstances under which confidentiality may be breached, including when there is "sufficient evidence to raise serious concern about […] the safety of clients" (Malta Psychology Profession Board, 2012, p. 6).

Overview of Chapters

This chapter introduced the study, and outlined the terminology used to denote and define suicide. Various theoretical frameworks for suicide were presented, and some information regarding the Maltese context was provided as a backdrop to this study. In the next chapter, a review of the literature is provided, including the limitations of suicide research, the epidemiological data and risk factors, as well as cultural implications.

Chapter three outlines the research methodology. The findings from this study are presented in chapter four; and are discussed in the light of the relevant literature in chapter five. The study is concluded in chapter six, which includes a summary of the main findings, limitations of this study, and recommendations for research, policy and practice.

Literature Review

Introduction

The aim of this literature review was to provide an in-depth understanding of suicide, to identify gaps in the existing literature, and to inform this study's research questions. The first part of this chapter evaluates current empirical data on suicide and their limitations. Subsequently, suicide epidemiology, risk factors, and cultural implications, are explored. This chapter concludes with a brief review of the literature on suicide prevention, assessment, and intervention.

Evaluating Suicide Data

Despite significant advancements, empirical data on suicidal behaviour remains relatively limited (Van Orden et al., 2010). Various explanations for these limitations have been proposed, including: difficulties in studying suicidal behaviour; ethical and safety concerns; and limitations in theoretical models (Prinstein, 2008). Some of these limitations are explored in this section.

Nomenclature. The validity of suicide statistics has been recurrently questioned in the literature. One of the salient issues is the discrepancy in nomenclature and inconsistent definitions in suicide research (Crosby et al., 2011; Goldney, 2010). As outlined in the Introduction chapter, the WHO highlighted the importance of up-to-date applications of uniform criteria and definitions surrounding suicide (Krug, Dahlberg, Mercy, Zwi, & Lozano, 2002).

Reporting and recording. Another significant issue is that data on suicide frequently underestimate the true prevalence in a population, due to both under-reporting and misclassification or inaccurate recording of suicides (Crosby et al., 2011; Krug et al., 2002). Even within the same country, different sources of data have produced different suicide rates

(Ji, Kleinman, & Becker, 2001). Under-reporting has been attributed to state or religious sanctions (Goldney, 2010); political or social reasons (Krug et al., 2002); its sensitivity in the family and community (Speechley & Stavraky, 1991; WHO, 2014); and stigma and shame (Crosby et al., 2011).

Misclassification has been attributed to variations in how a death is determined to be a suicide, leading to misclassification of suicide as an accidental, natural, or undetermined death, or by attributing it to an alternative cause (Goldney, 2010; Krug et al., 2002; Pritchard & Hansen, 2015). Furthermore, autopsy rates have also been correlated with suicide rates, leading to issues in the reliability and validity of suicide statistics due to changes in attitudes and funding towards autopsies, possibly leading to misclassification of deaths (Kapusta et al., 2011).

Other limitations. In addition, issues with mortality data include unreliable registration of deaths (WHO, 2014); differences in jurisdictional requirements for coroners or medical examiners classifying a death as suicide; and differences in investigations determining the cause of death (Crosby et al., 2011) or inaccurate death scene investigations due to inadequate training of responders. Limited information on death certificates, and a lack of national data collection, have also been highlighted (U.S. Department of Health and Human Services, 2012).

The need for improved surveillance systems has therefore been outlined, as erroneous reporting of suicide data may lead to inaccurate identification of at-risk populations. Moreover, it is important to link information drawn from different data systems in order to provide a more comprehensive picture of suicide (U.S. Department of Health and Human Services, 2012). In an attempt to address this issue, the CDC have recommended data

elements to be included in surveillance systems when collecting data on suicide, in order to improve the quality and consistency of data (Crosby et al., 2011).

Despite these limitations, the overall epidemiological data on suicide has an acceptable level of reliability (Andriessen, 2006; Speechley & Stavraky, 1991). However, when looking at suicide data, it is important to take the above limitations into account in order to obtain a more accurate understanding of the data.

Classification of Suicidal Behavior

Various classification systems have identified three main functions of suicidal behavior, namely: agency, intent, and outcome (De Leo et al., 2006). Agency refers to self-instigation of suicide, where the individual is responsible for the act, even if the individual is not the active agent. Intent refers to the desire for the outcome, namely death. Outcome refers to the actual or believed potential for death (Posner et al., 2014).

Suicidal behavior has at times been classified by outcome or fatality: namely fatal or non-fatal suicidal behavior (De Leo et al., 2006). However, variations have led to imprecision and inconsistent classification. Instead, intent-based definitions have received the most empirical support in classifying suicidal behavior (Crosby, Ortega, & Melanson, 2011; Linehan, 1997; Posner et al., 2014).

Intent may be stated or inferred. Inference may be based on the individual's perception of the lethality of the behavior; circumstances of death which clearly evidence the intent to die; input from informants such as family members; or psychological assessment (Krug et al., 2002; Posner et al., 2014). Definitions have therefore been proposed in order to clarify the classification of suicidal behavior, as outlined in the respective section of the introductory chapter.

Furthermore, suicide and non-suicidal self-directed violence are conceptually distinct. However, while it is important to differentiate the two, they also share common features and are complexly interrelated. This relationship is under-studied, and research is needed in this regard, such as to understand how non-suicidal self-directed violence contributes to suicide risk (Muehlenkamp, 2014).

DSM-5. The Diagnostic and Statistical Manual of mental disorders (DSM-5) introduced "suicidal behavior disorder" and "nonsuicidal self-injury" as proposed sets of criteria for which further research is recommended. "Suicidal behavior disorder" requires the individual to have made a suicide attempt in the past 24 months, and a suicide attempt is defined as "a self-initiated sequence of behaviors by an individual who, at the time of initiation, expected that the set of actions would lead to his or her own death" (American Psychiatric Association [APA], 2013, p. 801). "Nonsuicidal self-injury" is differentiated from the former by the absence of suicidal intent, either as stated by the individual or inferred by the behavior (APA, 2013, p. 803).

ICD-10. The International Classification of Diseases (ICD-10) referred to "intentional self-harm" by various methods (WHO, 2000). The ICD-11, although not yet implemented, makes use of the categories "intentional" and "unintentional". Definitions are provided for suicide attempt, suicidal behavior, suicidal ideation, and different types of intentional self-harm classified by suicide method. These are differentiated from non-suicidal self-injury, which is characterized by "the expectation that the injury will lead to only minor physical harm" (WHO, 2018a).

Epidemiology

Globally, more than 800,000 people die by suicide every year (WHO, 2014). There are variations in the prevalence, characteristics, and methods of suicide across different

communities or demographic groups and across time (Bachmann, 2018; WHO, 2014). Internationally, the overall suicide rates have decreased between the years 2000 and 2012, however this varies across countries, with some experiencing an increase and others a decrease in rates (WHO, 2013b).

Suicide rates appear to be higher in high than low or middle-income countries, despite a larger number of suicides in the latter due to larger populations (WHO, 2013b). However, it is important to note that high-income countries have much better-quality vital registration systems, which impact the WHO's suicide mortality data. Different reporting and recording practices across countries may also lead to underreporting and misclassification of suicides (Bachmann, 2018). Moreover, while studies point to an association between suicide and poverty in low-income countries, there is insufficient data to draw conclusions regarding suicide in low-income countries (Iemmi et al., 2016).

Risk Factors

In this section, the literature regarding multiple suicide risk factors is reviewed. The risk factors for suicide are complex and include: demographic, psychiatric, personal life events, and environmental factors (Krug et al., 2002). Risk factors may vary across different communities (Crawford, Kuforiji, & Ghosh, 2010).

Moreover, various interacting factors may contribute to suicide, rather than direct causal relationships. Therefore, a multi-factorial approach is necessary in understanding and preventing suicide (Hawton & Pirkis, 2017; Meichenbaum, 2005). While risk factors are presented in a structured manner for the purpose of this literature review, these must not be seen in isolation, and the multifactorial and culturally varied nature of suicide must be kept in mind (Maris et al., 1992).

Demographic Factors

Gender. It is well established that while females have significantly higher rates of suicide attempts, males have significantly higher rates of suicide (Langhinrichsen-Rohling, Friend, & Powell, 2009). This has been found consistently across most cultural groups. However there are variations in the gender disparity in suicide across different countries and ethnic groups, such as a high disparity in the U.S. and in African Americans, but a low disparity in Korea and in Asian Americans, respectively (Hee Ahn, Park, Ha, Ho Choi, & Pyo Hong, 2012).

In high-income countries, the male to female ratio of age-standardized suicide rates was 3.5 in 2012, while in low-income countries it was 1.6, and varied significantly across countries (WHO, 2013b). These gender differences may be attributed to issues surrounding gender equality; socially acceptable means of coping; alcohol consumption; and help-seeking behavior (WHO, 2014). The choice of suicide method has also been associated with gender differences (Hee Ahn et al., 2012). In addition, wound site has also been implicated, whereby males were more likely to shoot themselves in the face versus the body, than females (Callanan & Davis, 2011; Stack & Wasserman, 2009).

Furthermore, in a study by Cibis et al. (2012), males had higher levels of lethality than females, even when low-risk methods were used. Therefore, other factors must be considered in order to understand these gender differences, such as intent, method implementation, and accessibility. However, Denning, Conwell, King, and Cox's (2000) findings indicated that although women used less violent methods than men, this did not represent a reduced lethality of suicidal intent. Further research is required to gain a better understanding of these gender differences.

In exploring suicide rates, it is also important to note that other risk factors may vary depending on gender. For example, in Japan, unemployment was an important risk factor for men, while fertility rate was an important risk factor for women (Liu et al., 2013). Therefore, as indicated earlier, the complexity of interrelating factors must be considered.

Age. In almost all the regions of the world and across gender, suicide rates are lowest under the age of 15 and highest over the age of 70 (WHO, 2013b). Suicide rates appear to increase with age from 60 to 90 years of age, then decline again (Shah, Bhat, Zarate-Escudero, DeLeo, & Erlangsen, 2016).

Moreover, suicide is rare in childhood and early adolescence, but increases sharply with age in adolescence, and is one of the most common causes of death in young people. This may be understood in terms of a decrease in support systems; developmental changes that increase the vulnerability to stress; and increased psychopathology in adolescence (Pelkonen & Marttunen, 2003).

Despite this consistency, there are nonetheless significant variations in the patterns between the ages of 15 and 70 across different countries and regions. Low-income countries tend to experience higher rates at young and old age, and high-income countries experience higher rates at middle age (Shah, 2012; WHO, 2013b). Furthermore, the variations in suicide rates with age across population, gender, and time may be accounted for by cohort effects shaped by differences in demographic structure, family changes, socioeconomic stressors, and access to services (Pampel & Williamson, 2001; Snowdon, Phillips, Zhong, Yamauchi, Chiu, & Conwell, 2017; Thompson, Barnsley, & Dyck, 1999). Variations in countries' quality of data must be kept in mind when interpreting these results.

Birth cohort. Various studies have identified variations in suicide rates by patterns of birth cohort (Dougall et al., 2017; Stockard & O'Brien, 2002). Higher suicide rates have been

attributed to cohort characteristics of less integration and regulation, including: cohorts experiencing social and economic changes; cohorts that are larger in size; and that have higher rates of nonmarital births (Phillips, 2014). However, research on cohort effects carries the challenge of distinguishing between the effects of cohort membership, and other age-related or temporal patterns, which is often difficult to ascertain (Yang, 2007).

Marital status. Studies have consistently found that non-married people are at higher risk of suicide than married people, across gender and age (Denney, Rogers, Krueger, & Wadsworth, 2009; Kyung-Sook, SangSoo, Sangjin, & Young-Jeon, 2018). This finding may be understood in terms of the theory of marital status integration, which suggests that having a status which conforms to socially sanctioned expectations reduces role conflict (Cutright, Stack, & Fernquist, 2007; Gibbs, 2000), as well as societal integration theory, which suggests that marriage implies more domestic and religious integration (Durkheim as cited in Cutright, Stack, & Fernquist, 2006).

Nonetheless, gender is an important moderating factor in this regard, as a higher risk has been identified for males (Kyung-Sook et al., 2018), particularly regarding widowhood (Denney et al., 2009). This gender difference has been explained in terms of men benefitting from marriage more than women, given women's investment in caring for the family (Stack, 1998).

In Italy, significant differences were noted in different regions of the country, which may represent different socio-cultural backgrounds, thereby highlighting the multi-faceted nature of suicide (Masocco et al., 2010). The finding that sociocultural factors mediate the relationship between marital status and suicide has been supported by other studies (Yip, Yousuf, Hon Chan, Yung, & Wu, 2015).

Nonetheless, the risk remained higher for unmarried individuals, despite changes in patterns of marital status over the past decades, such as an increase in cohabitation (Griffiths, Ladva, Brock, & Baker, 2008). Additionally, studies have highlighted the importance of differentiating separation from divorce when studying suicide (Corcoran & Nagar, 2010; Wyder, Ward, & De Leo, 2009). Further research is also required in order to understand the difference between acute marital separation and long-term separation or divorce (Ide, Wyder, Kolves, & De Leo, 2010).

Geographic area. In multiple studies across Austria, Germany, Spain, the U.S., and China, rural areas had higher suicide rates than urban areas (Álvaro-Meca, Kneib, Gil-Prieto, & Gil de Miguel, 2013; Fontanella et al., 2015; Ji et al., 2001; Kapusta, Zorman, Etzersdorfer, Pononcy-Seliger, Jandl-Jager, & Sonneck, 2008). This pattern may be attributed to reduced availability and accessibility of health care services in rural areas (Ji et al., 2001); rural socioeconomic decline; attitudes to help seeking; and access to means (Judd, Cooper, Fraser, & Davis, 2006). However, the evidence is inconsistent, as other studies have presented conflicting findings regarding rural and urban differences in suicide mortality, which may possibly be attributed to different conceptualizations (Helbich et al., 2017).

Employment. Employment and suicide rates are negatively correlated in most European countries (Reeves et al., 2015; Yur'yev, Värnik, Värnik, Sisask, & Leppik, 2010). An analysis of European suicide trends based on WHO data and employment databases indicated that reduced confidence in employment status and expectations of inadequate income with unemployment were correlated with suicide. This finding was stronger for males than females (Yur'yev et al., 2010). Moreover, in the U.K., the economic strain from unemployment and job insecurity were more relevant to suicide risk in older males, while debt and house repossession were more relevant to risk in younger males (Coope et al., 2014).

Schneider et al. (2011) conducted a psychological autopsy study in Germany, which is a synthesis of information from multiple informants and records. They found that being without work heightened suicide risk, including being unemployed, retired, or a homemaker. Adverse working conditions were also correlated with suicide, even when adjusting for mental illness. Furthermore, an increase in suicide has been reported with economic crises or recessions in various countries (Haw, Hawton, Gunnell, & Platt, 2015; Fountoulakis, 2017), as well as with fluctuations in the socioeconomic environment, such as increased casualised employment (Page, Milner, Morrell, & Taylor, 2013).

Financial issues. In a study by Coope et al. (2015) in England, recession and financial difficulties accounted for 13% of suicides. However, it is important to note that most of these individuals experiencing financial struggles were employed at the time of death. Similarly, in Hong Kong, it was found that during periods of increasing economic upheaval, there was an overall increase in suicide, consistent with other studies. However, while the suicide rate rose amongst the employed, it dropped amongst the unemployed (Yip & Caine, 2011). These findings therefore highlight the importance of distinguishing between population-level and individual-level risk factors; as well as between financial difficulties and employment risk factors; which although inter-related, may differ in their relationship with suicide.

Psychiatric Factors

Mental illness. Mental illness has been highly associated with suicide (Bachmann, 2018; Cavanagh, Carson, Sharpe, & Lawrie, 2003; Crump, Sundquist, Sundquist, & Winkleby, 2014; Orsolini et al., 2016), with depressive disorders and substance abuse being the most prevalent (Hawton, Comabella, Haw, & Saunders, 2013; Henriksson et al., 1993; Overholser, Braden, & Dieter, 2012). A high risk of suicide has also been associated with bipolar disorder, particularly during its depressive episodes (Gonda et al., 2012). Bertolote,

Fleischmann, De Leo, and Wasserman (2004) conducted a review of the international literature, including Europe, and identified mood disorders, substance-use disorders, schizophrenia, and personality disorders as the most prevalent diagnoses, in that respective order.

Furthermore, Barzilay and Apter (2014) found that the most important suicide risk factors for individuals with mood disorders were a history of suicide attempts, comorbid psychiatric disorders, and a family history of suicide. Comorbidity increased suicide risk in various disorders, such as personality disorder with depression (Hansen, Wang, Stage, Kragh-Sorensen, & The Danish University Antidepressant Group, 2003), as well as PTSD with major depressive disorder (Conner et al., 2014).

In addition to disorders, personality styles may also predispose individuals to mental health problems and suicide. According to the Psychodynamic Diagnostic Manual (PDM-2), individuals with a depressive personality style are vulnerable to painful affect including depression, inadequacy and shame. They are self-critical, self-punitive, and experience "internally arising attacks on the self" (McWilliams & Shedler, 2017, p. 29). However, research has predominantly addressed suicide in terms of mental illness rather than underlying personality style. Linehan (2008) warned against the danger of dismissing the importance of other factors which are not classified under the disease model.

Substance use. Various studies have highlighted the association between suicide and alcohol, opioid, as well as intravenous drug use (Wilcox, Conner, & Caine, 2004). This risk was found to increase significantly with comorbid psychiatric disorders (Bohnert, Ilgen, Louzon, McCarthy, & Katz, 2017). Moreover, a strong relationship has also been found between alcohol intoxication and suicide (Cherpitel, Borges, & Wilcox, 2004), with the strongest risk factor for alcohol intoxication prior to suicide being an existing alcohol

problem (Caetano et al., 2015). However, these studies carry several limitations, including a lack of uniform differentiation between different types of substance use or clinical profiles (Icick et al., 2017).

Treatment history. Studies have consistently shown that people who died by suicide had more visits to health care services in the year preceding suicide (Chock, Bommersbach, Geske, & Bostwick, 2015). A review of studies from the U.S. and multiple Northern European countries showed that in three-fourths of cases, there was contact with a primary care provider within the year of the suicide. In one-fifth of cases there was contact with mental health services within a month of the suicide. This finding was highest for older adults (Luoma, Martin, & Pearson, 2002). Perhaps more relevantly to the Maltese context, a study conducted with hospitalized psychiatric patients in Italy found that 2.2% died by suicide (Sani et al., 2011).

In addition, research indicates that males at risk of suicide are less likely to access mental health services than females (Hom, Stanley, & Joiner, 2015). Furthermore, the first week after admission, as well as the first two weeks after discharge from inpatient mental health services, have been consistently identified as periods of heightened suicide risk (Health Quality Improvement Partnership, 2018; NICE, 2016a).

Prior suicidal behavior. Unwaveringly across suicide research, a prior suicide attempt is one of the strongest risk factors for suicide (Bostwick, Pabbati, Geske, & McKean, 2016) and indicates a continued elevated suicide risk across the person's lifetime (Suominen et al., 2004). Goñi-Sarriés, Blanco, and Azcárate (2018) found that this correlation was mediated by mental illness; with the highest incidences being in individuals with personality, mood, anxiety, and substance use disorders; and the lowest incidences being in psychotic, organic, or no psychiatric disorders.

A history of self-directed violence also increases the risk of suicide across gender and age (Cooper et al., 2005; Tidemalm et al., 2015). In a study conducted in England and Wales, suicide risk in the year following self-directed violence was 49 times higher than that of the general population (Hawton et al., 2015). Moreover, this risk appears to be highest in cases of violent method use and repeated self-directed violence (Tidemalm et al., 2015). According to Cooper et al. (2005), females were at particularly high risk of suicide following self-directed violence, and the risk was highest in the first six months. Therefore, early intervention following self-directed violence is essential in suicide prevention.

Adverse Life Events

Physical illness. Studies have found a correlation between physical illness and suicide for various illnesses, such as stroke (Pompili et al., 2015), coronary heart disease, chronic obstructive pulmonary disease, osteoporosis (Webb et al., 2012), cancer, spine disease, and asthma (Crump et al., 2014). Moreover, elevated suicide risk was found independent of, yet significantly increased by, comorbid depression (Webb et al., 2012). However, further research is required in order to determine whether physical illness as a risk factor for suicide is mediated by functional impairment (Conwell et al., 2010).

Criminality. Multiple European studies have reported that a high proportion of individuals who died by suicide had a criminal justice history (Linsley, Johnson, & Martin, 2007; Webb et al., 2011). However there appears to be insufficient evidence regarding whether criminality independently increases suicide risk, or whether these findings are partly attributed to other factors shared by this population (Moscicki, 2014). Studies appear to have started addressing this issue, such as Stenbacka, Romelsjö, and Jokinen (2014) who found that the risk was heightened by substance use and psychiatric disorders; yet remained even

when controlling for these factors. Further research controlling for other potentially confounding variables is required.

Family bereavement. Both bereavement and bereavement by suicide have been associated with increased suicide risk. Some studies have found an association between the death of a partner or child and suicide risk, across gender and age (Mogensen, Möller, Hultin, & Mittendorfer-Rutz, 2016). However, it appears that this link is not directly causal, and is mediated by the personal experience and perception of the event (Moscicki, 2014).

Furthermore, the evidence regarding bereavement by suicide as a risk factor for suicide is inconsistent, as while some studies have found an increased risk (Niederkrotenthaler, Floderus, Alexanderson, Rasmussen, & Mittendorfer-Rutz, 2012), others have not (Pitman, Osborn, Rantell, & King, 2016). Further research may be required in order to better understand the relationship between bereavement and suicide risk.

Other life events. Recent life stressors, such as interpersonal conflict, may increase the risk of suicide, however the relationship is not causal (Overholser et al., 2012). In a study in Northern Ireland, adverse life events as risk factors were more relevant in older males. However, a limitation of this study was the lack of information on life events in the database used, which may impact the interpretation of results (O'Neill, Ennis, Corry, & Bunting, 2018). Moreover, according to Moscicki (2014), it is the personal impact of the event, rather than the event itself, which increases suicide risk. Individual factors, such as attributional style, may therefore mediate the link between adverse life events and suicide (Peterson & Seligman, 1984).

Situational and Suicide-related Factors

Season. The empirical evidence for seasonal effects on suicide is inconsistent, with some studies finding a relationship (Christodoulou et al., 2012), and others not (Ajdacic-

Gross et al., 2005; Yip, Chao, & Chiou, 2000). In a literature review conducted by Christodoulou et al. (2012), a peak in suicides was noted in spring, and a secondary peak in autumn. Bioclimatic, sociodemographic, and biological accounts of these variations have been presented (Christodoulou et al., 2012).

Moreover, in Northern European countries, peaks in May and October have been identified, which may be attributed to abrupt temperature changes and the consequent biological impact on depression (Holopainen, Helama, Björkenstam, & Partonen, 2013). However, in studying the seasonality of suicide, it is important to look at other factors and not season as a single variable, given that contradictory findings have been noted across time and countries (Casey, Gemmell, Hiroeh, & Fulwood, 2012; Woo, Okusaga, & Postolache, 2012).

Location. Studies on the location of suicide appear relatively limited. In a study of eight countries across Europe, Asia, Oceania, and North America, most suicides occurred at home (Rhee et al., 2016). Moreover, in a U.S. study, the large majority of suicides took place at home, while hospitals and outdoor settings were the second and third most common locations respectively (Kposowa & McElvain, 2006). Kposowa and McElvain (2006) also found a relationship between the place and method of suicide: with a correlation between home suicides and firearms, hanging, and drugs; and hotel suicides and drugs. These findings have important implications for preventative measures targeting access to means, which will be explored in the respective sections below.

Suicide method. The choice of suicide method varies by country or region, gender, age, and comorbidity, amongst other factors (Callanan & Davis, 2012). However, data on suicide method is limited, particularly due to the lack of data in low-income countries, whereby the methods used for 72% of suicides were unclear (WHO, 2014). According to the WHO (2014), the Maltese Islands classify as a high-income country.

Pesticide self-poisoning appears to be highly prevalent in rural areas in low and middle-income countries (WHO, 2018b). In high-income countries, hanging is the most commonly used suicide method, across gender (WHO, 2013b). Across most of Europe, the second and third most prevalent methods appear to be firearms and poisoning for males, and self-poisoning and jumping for females, respectively (Varnik et al., 2008). This study included some Mediterranean countries, but not the Maltese Islands.

To date, most research on suicide methods has investigated gender and age differences; and evidence is lacking with regards to other characteristics. With regards to age, the most commonly used methods amongst older adults appear to be hanging, firearms, and self-poisoning (Kapusta, Etzersdorfer, & Sonneck, 2007; Koo, Kõlves, & de Leo, 2017). The choice of method may also be mediated by mental illness. Jumping from heights was more common in psychotic disorders; self-poisoning in substance use disorders; and different methods in depressive or affective disorders (Huisman, van Houwelingen, & Kerkhof, 2010; Hunt et al., 2010).

Moreover, while some methods continue to be used, others vary significantly over time. For example, in a study of time periods in the U.K., hanging remained the most commonly used method, however drowning and weapons decreased, and a change in type of poison was observed across the time periods. These changes may be attributed to access as well as acceptability of method in different time periods (Thomas, Beech, & Gunnell, 2013). Similar findings were observed in Australia, with a decrease in firearms and an increase in hanging (Elnour & Harrison, 2008).

The lethality of the suicide method is also a risk factor (Lim, Lee, & Park, 2014; Park, Ahn, Lee, & Hong, 2014). In a study of suicide methods and rates in the U.S., South Korea, and Finland, an increase in rates was associated with an increase in hanging in the former two

countries, but not in the latter (Park et al., 2014). The choice of a lethal method may also be increased by alcohol consumption (Park et al., 2017). In addition, in the majority of suicides by individuals with a history of suicide attempts, there was a change in method to a more lethal one (Paraschakis et al., 2014).

Kolves, McDonough, Crompton, and de Leo (2018) found that socio-cultural acceptability and availability of method are the key drivers in the choice of method. Accurate data and an understanding of the choice of methods of different populations are therefore necessary for the implementation of effective prevention strategies, such as the restriction of access to means (WHO, 2014).

Protective Factors

Research on protective factors against suicide is limited when compared to the evidence for risk factors. Moreover, the few studies which have investigated protective factors were conducted with small samples, have not been replicated, and have inevitably focused on suicide attempts (Bertolote, 2014). While it is not within the aims of this study to investigate protective factors, the literature is briefly reviewed given that suicide-related factors are often inter-related.

Studies have provided preliminary evidence for emotional intelligence (Cha & Nock, 2009); perceived responsibilities for family (Chan et al., 2009); social support (Zadravec Šedivy, Podlogar, Kerr, & De Leo, 2017); and moral or religious objections to suicide (Lizardi et al., 2008) as protective factors against suicidal thoughts and attempts. While some research indicates that religion may be a protective factor, this finding has not been consistently found (Wang, Wong, Nyutu, Spears, & Nichols, 2016). This variation is explored in the next section on cultural implications.

Cultural Implications

Studies have highlighted the importance of understanding the socio-cultural context surrounding suicide. Differences in suicide rates have been associated with cross-cultural and regional variability in risk factors; perception and awareness surrounding mental illness and suicide; as well as help-seeking behaviour, including attitudes, stigma and shame (Dervic et al., 2006; Reynders, Kerkhof, Molenberghs, & Van Audenhove, 2014; 2016).

An example of this variation is in Israel, where different suicide rates have been found for sub-populations (Lubin, Glasser, Boyko, & Barell, 2001). Another example is in China, where patterns of suicide contrast with Western societies, including higher rates in females than males for some demographic groups. This may be understood in terms of the sociocultural context, including economic stressors, female oppression, and disintegrating support systems (Ji et al., 2001).

According to Webster Rudmin, Ferrada-Noli, and Skolbekken (2003), approximately 25% of the variance in international suicide rates may be accounted for by the following cultural traits: power-distance, uncertainty avoidance, individualism, and masculinity. In an international study of cultural values in relation to suicide, individualism predicted higher prevalence of male suicide across age groups, but not for females. However cultural values predicted female suicide more than male, possibly indicating that social norms and values are more oppressive for females than males (Webster Rudmin et al., 2003).

Furthermore, there are also cultural variations in protective factors. A review of WHO data indicated that religious participation was protective against suicide in some regions of the world, but a possible risk factor in other regions. This variation may be attributed to differences in the integration and regulation of religious communities in that region.

Moreover, underreporting in certain regions of the world may also impact these findings, and requires further research (Hsieh, 2017).

Local Scenario

Mediterranean countries have overall lower suicide rates than other European countries (Chishti et al., 2003; Helema et al., 2014). However, in the Maltese Islands, it appears that suicide is under-reported, which may lead to difficulties in determining its prevalence (Department of Health Information and Research [DHIR], 2013).

Meilak, Cassar, and Grech (1974) studied suicide in Malta between 1955 and 1972, in terms of incidence, as well as social, psychiatric, and forensic factors. The data for this study were gathered from the Magistrate's inquests register, post-mortem protocols, and hospital records. In this time period, 128 male and 43 female suicides were recorded. The peak in age distribution was at 55 to 64 years for males and 75 years and over for females. Physical illness and mental illness, particularly severe depression, were common amongst individuals in their study.

According to the WHO, suicides were only reported for males between 1970 and 1990, with no female incidents reported. Furthermore, the rate of male suicide increased five-fold between 1970 and 1995; with a rate of 4.0 per 100,000 in 1997 (WHO, 1999).

Scicluna (1994) analysed 64 suicides and 687 suicide attempts from 1990 to 1993 in the local context, for patterns of occurrence and aetiological factors. In her study, a peak between the ages of 30 and 49 was noted. Hanging was the most common suicide method overall and amongst males; and drowning amongst females. Recommendations included the setting up of a suicide crisis intervention centre; as well as a suicide register, due to the lack of consensus regarding suicide classification.

According to the WHO, the suicide rate in the Maltese Islands was 12.3 per 100,000 population for males and 0.5 per 100,000 for females in 2007 (WHO, 2011). Moreover, according to the DHIR (2019), 0.7% of all deaths amongst Maltese residents in 2017 were deaths by suicide.

While it appears that reported suicide rates in the Maltese Islands are lower than in other European countries; these rates appear to have significantly increased in the 1990s and 2000s (DHIR, 2013; 2015), as opposed to other European countries which appear to have experienced a decline in recent decades (Helema, Holopainen, & Partonen, 2014).

Prevention, Assessment, and Intervention

Research on suicide is necessary in order to study effective prevention, assessment, and intervention (National Action Alliance for Suicide Prevention, 2014). Findings from epidemiological research should lead to integrative case conceptualization models, including risk and protective factors, to inform assessment and intervention. Partnerships between researchers and policymakers are also necessary to provide evidence-based policies and programs aimed at reducing suicide (Meichenbaum, 2005; Sareen et al., 2014).

Prevention. While there have been significant advancements in the area of suicide prevention, there remain a large number of countries without a national strategy or action plan for suicide prevention. Prior to implementing such national responses, surveillance or data collection of suicides is necessary (WHO, 2014).

Evidence-based suicide prevention strategies include: treating depression; increasing the provision of health care; and providing school-based prevention (Zalsman et al., 2017). Reducing access to lethal means has received the most empirical support, while other interventions such as staff training and responsible media reporting appear effective but require further research (Cox et al., 2013). With regards to reducing access to means,

Florentine and Crane (2010) maintained that both physical access, as well as cognitive availability through the media, must be reduced.

Improving suicidal individuals' access to appropriate mental health services is a critical component of prevention strategies. Factors which facilitate such care include mental health literacy, positive perceptions of mental health services, and family or friends' encouragement (Hom et al., 2015). Furthermore, given the multifactorial nature of suicide, prevention requires different strategies, including universal interventions at a population level such as reducing access to means; selective interventions at a sub-group level such as psychological therapy for at-risk groups; as well as indicated interventions at an individual level for those at immediate risk (Hawton & Pirkis, 2017).

Assessment. An important component of suicide assessment is the identification of specific factors that may increase or decrease risk, and impact intervention (APA, 2006; Linehan, Comtois, & Ward-Ciesielski, 2012; Steele, Thrower, Noroian, & Saleh, 2018). In addition to risk factors, research is also needed on "drivers [or] patient-specific warning signs" of suicide in order to better inform clinical assessment (Tucker, Crowley, Davidson, & Gutierrez, 2015, p. 681).

Various assessment tools have been created in order to assess cognitions and suicide risk, including the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) assessing the level of depression, and Beck, Kovacs, and Weissman's Scale for Suicide Ideation (as cited in Bedrosian & Beck, 1979) assessing suicidal ideation. While various assessment instruments are available, several limitations of their accuracy in clinical practice have been highlighted (Runeson et al., 2017). Therefore, these should only be used as aids to thorough clinical evaluation, which would include the individual's current presentation, history, psychosocial situation, and strengths and weaknesses (APA, 2006).

Intervention. Psychological trials have reported better treatment of suicidal behaviors than pharmacotherapy alone (Ward-Ciesielski & Linehan, 2014). Evidence-based psychotherapeutic approaches include cognitive therapy and dialectical behavior therapy (Jobes, Au, & Siegelman, 2015). In addition to these two, problem-solving therapy, mentalization-based treatment, and psychodynamic interpersonal therapy have also received some support for the treatment of suicidal behavior in adults (Brown & Jager-Hyman, 2014).

Across interventions, it is important for professionals to be specifically trained in the treatment of suicidal behaviors (Ward-Ciesielski & Linehan, 2014). Early intervention and a good therapeutic alliance are two critical components when working with suicidal individuals. Furthermore, it is important to address the clinical challenges associated with working with suicidal individuals, including the high rates of nonadherence and drop out from treatment (Meichenbaum, 2005).

Conclusion

This chapter provided a review of the literature, namely the evaluation of suicide data, the epidemiology and risk factors pertaining to suicide, as well as cultural implications. Literature on suicide prevention, assessment, and intervention was also considered. Furthermore, the international literature, and the limited local literature, point to gaps in the current bank of knowledge, and have both informed this study's research questions. In the next chapter, the methodology which was adopted to address these research questions will be described in detail.

Method

Introduction

The main aim of this study was to examine the epidemiological data of persons who died by suicide in the Maltese Islands from 1995 to 2018. This chapter describes the methodology which was used to address the study's research questions. This includes: the underlying theoretical paradigm, the research design, the data collection and analysis. In addition, the study's reliability and validity, as well as the ethical considerations which were made throughout the study, are presented in this chapter.

Research Questions

The research questions guiding this study were three-part. The first two research questions were descriptive, while the third part was relational in nature. The research questions were based on the literature and hypotheses were provided for each of the relational research questions (Tully, 2014).

Part 1: What is the prevalence of suicide in the Maltese islands between 1995 and 2018? This question pertained specifically to death by suicide and did not include suicide attempts or other suicidal behaviour.

Part 2: What is the frequency of each of the variables presented in Table 3? These included demographic variables, suicide related variables, psychiatric variables, and adverse life events.

Table 3

Overview of variables

Demographic	Suicide related	Psychiatric	Adverse life events
Gender	Time of suicide	Mental illness	Physical condition
Age	Month and season	Psychiatric medication	History of abuse
Cohort	Year	Psychiatric services	Loss of other
Marital status	Location	Time since last contact	Family history
Nationality	Locality	Substance abuse	Legal
Residence	Hotspots	Suicide attempts	Financial
Employment status	Suicide method		Relationship issues
Occupation	Toxicology		
	Suicide note		
	Communication		

Part 3:

- What are the gender differences in terms of age, marital status, suicide method, and contact with psychiatric services?

It was expected that males would have an older average age than females (Snowdon et al., 2017; Varnik, 2012). It was expected that males would be at higher risk following separation and widowhood than females (Denney et al., 2009; Kyung-Sook et al., 2018). It was expected that males would employ more lethal suicide methods than females (Varnik et al., 2008). Firearms, drowning, hanging, and jumping are classified as lethal methods, as opposed to self-poisoning and sharp objects (Card, 1974; Spicer & Miller, 2000). It was expected that females would make more contact with psychiatric services than males (Hom et al., 2015).

- What are the age differences in terms of suicide method?

It was expected that individuals who use firearm and self-poisoning methods would have an older average age (Koo et al., 2017; Snowdon et al., 2017).

- What are the trends over time in terms of gender, age, and suicide method?

It was expected that over time there would be an increasing suicide trend for males (WHO, 2014). It was expected that over time there would be a decrease in the older age groups (Snowdon et al., 2017). It was expected that over time there would be a decrease in firearms as a suicide method (Elnour & Harrison, 2008; Thomas et al., 2013).

Research Paradigm

The study's research paradigm addresses questions of ontology, epistemology, and inquiry or methods used. The former two are explored in this section, while the method is explored in the respective section on research design. The ontological and epistemological positions adopted in this study were those proposed by post-positivism or critical realism, in which an objective reality is accepted, however this reality can only be known imperfectly (Bhasakar, 1975; Clark, 1998). These paradigms therefore account for the impact of external influences and biases on reality.

Consequently, a quantitative research methodology was used in this study, as it adequately investigated the research questions. The following factors informed the choice of methodology for this study. The quantitative methodology offered precise measurement, thereby addressing the first and second research questions regarding the prevalence of suicide and frequency of variables. It also offered predictive power in terms of generalisability, thereby addressing the third research question regarding the relationship between variables (Bryman, 1984; Langdridge & Hagger-Johnson, 2009). Moreover, this approach allowed for the findings of this study to be compared with the international scenario (Neuman, 2014), which will be explored in the Discussion chapter.

Research Design

The research design employed in this study was that of secondary data analysis. This design involves the use of existing data by a researcher who was not involved in its original collection (Greenhoot & Dowsett, 2012; Neuman, 2014). This design was chosen as it appropriately addressed the study's research questions. The sources of data, as well as the data collection process, will be explored in detail in the respective sections below.

Data Collection Tool

A template was created and used as a research tool in order to collect the data for this study, and can be found in Appendix A. This was based on the template used for Felice et al. (2014)'s study and amended as necessary. The templates were printed on individual sheets of paper, using one template per individual who died by suicide. The rationale for the selection of the items in this data collection tool was based on the literature, as described in the respective chapter. Moreover, this was adapted to the information available in the data sources used for this study.

Population

The population of this study consisted of all the individuals who died by suicide in the Maltese Islands between the years 1995 and 2018. The inclusion criteria were: individuals who were both nationals and residents of Malta and Gozo; as well as foreign nationals who were on the Maltese Islands at the time of death. Individuals with a Maltese nationality, but who were not residents of the Maltese Islands, were excluded from the study. Therefore, the individuals who met the criteria for a cause of death by suicide during this time period in the local context, were included in the study.

Data Sources

Multiple sources of data were used in this study. This served the purpose of ensuring a comprehensive collection of data, particularly given the issues surrounding determining the cause of death and intent, as well as the discrepancy amongst the different entities or professionals. Furthermore, the rationale for the choice of the sources of data was based on the research questions presented earlier, as well as availability. Table 4 provides an outline of the sources of data used in this study, each of which will be elaborated in turn below.

Table 4

Sources of data

Entity	Type of data
Felice et al. (2014)'s study	Secondary data
Post-mortem Records	Post-mortem Register
	Forensic Post-mortem Examination Form
	Forensic Post-mortem Histopathology Form
	Toxicology reports
	Certificate of Death and Cause Thereof
	Any additional case notes
Department of Health Information and Research (DHIR)	National Mortality Register
Mount Carmel Hospital (MCH; psychiatric hospital) medical records	Database
	Patient files
Mater Dei Hospital (MDH; general hospital) medical records	Database
	Patient files

Procedure

The gatekeepers or professionals responsible for each source of data used in this study were contacted, and meetings were held with each professional respectively. Figure 1 presents an outline of the data collection procedure. This process of data collection took place over several months, from October 2018 to March 2019. Where possible, data were cross-checked across the different sources of data in order to ensure accuracy.

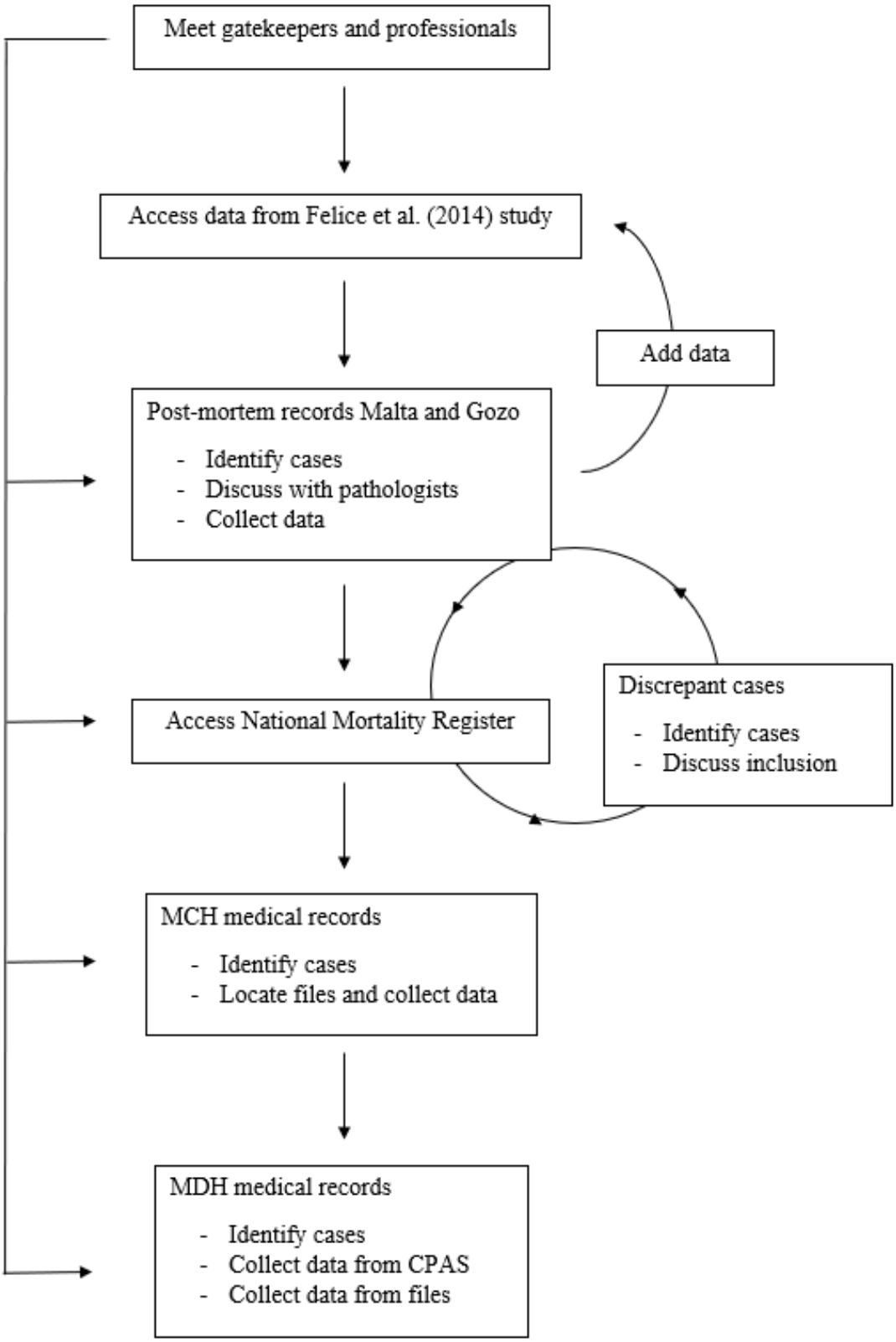

Figure 1. Data collection procedure.

Felice et al. (2014)'s study methodology. Felice et al. (2014)[1] carried out a retrospective study of suicides between 2002 and 2013. While data for all nationalities were initially collected, only Maltese nationals were included in their study, omitting foreign nationals. The number of suicides by age group, gender, and year of death was extracted from the National Mortality Register. Further data were obtained from the post-mortem register and reports at MDH; as well as the Patient Administration System of MCH to identify any admissions and final ICD-10 diagnoses.

The data were then inserted into Microsoft Excel spreadsheets, which were used to draw up graphs for observation of emerging patterns in the results. The factors investigated included nationality, sex, age, suicide method, monthly occurrence, marital status, mental health history and any precipitating factors. The number of suicides in each category of these variables was taken as a percentage of the total data available for that variable.

Use in present study. Correspondence was made with all the authors of the abovementioned study, and a meeting was held with Dr Ethel Felice, psychiatrist, in order to discuss the study. Three Microsoft Excel documents with the data from Felice et al. (2014)'s study were provided for use in this current study. The data in these three documents were thoroughly cross-checked with each other in order to create a final set of data for use in the current study.

In addition, the data for the time period of Felice et al. (2014)'s study were amended as follows: individuals with foreign nationalities were added; and further data for the individuals from Gozo were added. The variable *location of suicide* listed as *general hospital*

[1] The idea to carry out research on suicide was that of Dolores Gauci. The research team held several meetings to discuss the methodology and risk factors pertaining to suicide. Marie Therese Camilleri Podesta supervised students who collected the data from the mortuary for 2002 to 2013. Ethel Felice and Elena Felice collected the data from MCH and MDH. Kathleen England provided the data from the National Mortality Register (E. Felice, personal communication, June 3, 2019).

was removed when it was indicative of the location of death and not the location of suicide, in order to increase the accuracy of the data. This was done by checking the post-mortem records for the individuals in Felice et al. (2014)'s study. The MCH medical records database was also verified regarding MCH admissions for Felice et al. (2014)'s data, given lack of clarity in the secondary data.

Post-mortem records. The post-mortem records were obtained from the mortuary at MDH as well as the Gozo General Hospital. Multiple meetings were held with Prof Marie Therese Camilleri Podesta, pathologist, for the cases in Malta; as well as Dr Bridget Ellul, pathologist, and Dr Michael Refalo, forensic medical expert, for the cases in Gozo. These regular meetings were held in order to gather the data as comprehensively as possible and to discuss queries regarding the data.

The post-mortem records included the following sources of data. The Post-mortem Register included the list of case numbers and the causes of death, by date. The Forensic Post-mortem Examination Form included: ID number, age, sex, place and date of death, circumstances of death, external and internal exam, and conclusion. The Forensic Post-mortem Histopathology Form was used in some cases in order to assist in determining the cause of death. The Toxicology reports were used in order to assist in determining the cause of death, as well as whether the individual had used any substances prior to the death. The Certificate of Death and Cause Thereof included: ID number, sex, age, date of birth, nationality, residence, employment status and occupation, marital status, date and time of death, place of death, and cause of death. A sample can be found in Appendix B. Any additional case notes available were also reviewed for the relevant variables.

Therefore, the Post-mortem Register was first searched for any cases where the cause of death may have been suicide. When such cases were identified, the case number was used

in order to find the other documents outlined above. Through the information provided on these documents, the cause of death was confirmed where possible. Suicides were therefore differentiated from other causes of death, namely homicides, accidental deaths, and natural causes, listed in the Register. The relevant data were then obtained from the abovementioned documents, filling in one template per individual. This was done for the years 2014 to 2018 for Malta, and 1995 to 2018 for Gozo.

When cases were unclear, these were discussed with the respective pathologists. Additionally, when reports were missing, these were searched for or requested from the professionals at the mortuary where possible. In 2011 there was a change in the Gozo mortuary record system, and in earlier years there was a change of staff, therefore some data may have been missing due to these limitations. However, efforts were made to correspond with other staff members in order to ensure as accurate a data collection as possible. Some data remained missing, including pending toxicology reports, particularly for the year 2018.

Some cases remained unascertained, such as when the body was found in a state of putrefaction. In addition, the post-mortem records do not aim to determine intent, given the medical rather than circumstantial focus, therefore suicides may not have always been readily identified. Moreover, it must be noted that in the post-mortem records, the cause of death is listed in medical terms such as *asphyxia* or *cardiorespiratory failure* rather than *hanging* or *self-poisoning* respectively. Given these limitations, the data were checked with other sources, as will be described below.

National mortality register. Meetings were held with Dr Kathleen England, public health consultant, and an application form, namely the Request for Record Level Data, was submitted to the DHIR in order to access the National Mortality Register. The National Mortality Register is compiled using the death certificates from mortuary, together with a

yearly list of deaths provided by the Malta Police Force. When these two sources do not correspond, Dr England liaises with the respective professionals in order to compile the final register.

The data obtained from the National Mortality Register for this study included deaths by suicide from 1995 to 2017. The data for 2018 were not yet completed at the time of the data collection. Furthermore, some data may have been missing for the years 1995 to 2008 due to a change of database in the year 2008.

Furthermore, the data in the register are coded according to the ICD-10 causes of death. The following data were obtained from the register for use in the study: ID number, date of birth, residence, nationality, sex, age, occupational status, marital status, date of death, type of place of death, and cause of death.

MCH medical records. The MCH files of individuals who died by suicide between 2014 and 2018 were accessed. Mr Oswald Balzan, administrator, provided lists of the filing systems used for all patients at the MCH medical records. The data from the Post-mortem Records and National Mortality Register were then used in order to find the respective files by checking the ID card numbers and names with those in the medical records list. Once the individuals who died by suicide and who had a file at MCH were identified, the respective physical file was then searched for at the MCH archives.

Files were found for most of the cases, with the exception of three cases which were not listed in the medical records; one file which had been destroyed; and one file which had been retained by the police. A total of 36 files were located and used for data between the period of 2014 and 2018. The data collected from the MCH files included: mental illness, psychiatric medication, psychiatric services and admissions, previous suicide attempts, substance abuse, and other relevant variables when available.

MDH medical records. The MDH medical records and files of individuals who died by suicide between 2014 and 2018 were accessed. Ms Margaret Baldacchino Cefai, health informatics administrator, provided access to the MDH medical records and files. The CPAS (Patient Administration System) computer system was first used in order to identify the cases using ID card numbers. The following data were collected from CPAS: any admissions or appointments at the Psychiatric Outpatients (POP; MDH), the Psychiatric Unit (PU; MDH), the Gozo General Hospital psychiatric services, the psychiatric health centers, and any admissions at the Accident and Emergency Department (A&E; MDH) for crises or psychiatric reasons.

Using these data, the individuals who had a relevant physical file were identified, and these files were requested for further data collection. Files were found for most of the cases, with the exception of four files which could not be located; three files which had been retained by the forensic department; and one file which had been retained by the pathology department. The data gathered from the MDH files included: mental and physical illness, psychiatric medication, psychiatric services and admissions, previous suicide attempts, substance abuse, and other relevant variables when available.

Discrepant cases. There were 95 cases which were present in Felice et al. (2014)'s study for the years 2002 to 2013 and in the post-mortem records for the years 2014 to 2018, but not present or not classified as suicides in the National Mortality Register. 63 of these 95 cases were illicit drug overdoses, predominantly heroin. In these cases, it was not possible to determine intent, therefore these were omitted from the study, with the exception of one case where intent was specified in the post-mortem records.

In the data collected between 2014 and 2018, there were 6 cases of heroin overdoses, and 1 case of overdose pending toxicology, for which the information from the post-mortem

records as well as MCH or MDH medical files indicated the possibility of these being intentional or suicides. This included the presence of recent suicidal ideation or attempts, amongst other factors. Nonetheless, despite this information, intent could not be ascertained, therefore these cases remained classified as queries and were not included in the study. Further information regarding these cases is presented in Appendix C.

For the remaining 32 of the 95 cases, having a cause of death other than illicit drug overdoses, the post-mortem records were used to determine inclusion in the study. This was based on the information in the records as well as discussions with the relevant pathologists, whereby only clear cases of suicide, based on intent, were included. Unclear cases were omitted in order to ensure as accurate a dataset as possible given the sources available. Therefore 22 of the 32 remaining cases were included in the study and 10 were omitted.

Data Analysis

Classifying and coding variables. In line with best practice recommendations for secondary data analysis, the data were first explored in detail in order to ensure familiarity; and the data were then prepared for analysis (Greenhoot & Dowsett, 2012). The data collected were sorted, coded, and inserted into IBM SPSS Statistics. The codes used for each variable can be found in Appendix D. The variables for which an existing classification system was used are presented in Table 5.

Table 5

Variables' classification systems

Variable	Classification system	Further details
Residence	Local Administrative Units (LAUs) created by Eurostat [a], compatible with Nomenclature of Territorial Units for Statistics (NUTS) in the European Union	Presented in Figure 2 and described in further detail in Appendix E
Occupation	International Standard Classification of Occupations (ISCO-88) [b]	Outlined in Appendix F
Suicide method	ICD-10 codes for external causes of mortality: Intentional self-harm [c]	
Mental illness diagnosis	ICD-10 classification of mental and behavioural disorders [d]	*Undiagnosed depression* coded separately and refers to reported depression without an official ICD-10 diagnosis In cases of more than one diagnosis, recorded the most recent diagnosis
Psychiatric medication type	Anatomical Therapeutic Chemical (ACT) classification [e]	Limited description of potential uses and intended effects of medication [f]

[a]National Statistics Office (NSO, 2019). [b]International Labour Organization (1988). [c]WHO (2016). [d]WHO (1992). [e]WHO Collaborating Centre for Drug Statistics Methodology (2017). [f]Caraci et al. (2017).

Figure 2. Graphical illustration of the Maltese Islands by LAU classification. From *Regional Statistics Malta: 2019 edition*, by National Statistics Office, (2019), Valletta, Malta: National Statistics Office. Adapted with permission.

Statistical analysis. Once inserted into IBM SPSS Statistics, the data were explored before starting the analysis. The data exploration and analysis processes are described in detail in the Results chapter. The first part of the analysis provided the prevalence of suicide in the Maltese Islands between 1995 and 2018, as well as the descriptive univariate analyses for each of the above-mentioned variables, addressing the first and second research questions respectively.

The second part of the analysis provided bivariate analyses, in which statistical tests were carried out on selected variables. These analyses were carried out in order to address the third part of the research questions. The chi square test was used to analyse the relationship between categorical variables. The independent samples *t*-test and the one-way ANOVA test were used to compare mean scores between independent groups. Moreover, simple regression was used to analyse the trends over time (Agresti & Finlay, 2009; Field, 2013).

A supplementary analysis was carried out on *nationality* and selected variables. This was carried out in order to ascertain that the inclusion of both local and foreign nationalities in the study did not skew the findings, and that the findings reflected the local context and culture. This analysis can be found in Appendix G.

Additional Correspondence and Meetings

In addition to the research process outlined above, correspondences and meetings with the following professionals were held in order to gain a more holistic understanding of suicide research, as well as the situation surrounding suicide in the local context.

Correspondence was made with Prof Keith Hawton, Director of the Oxford Centre for Suicide Research UK, regarding suicide research (personal communication, October 5, 2018). The importance of ensuring as complete an identification of suicides as possible was outlined, as well as issues which commonly arise in epidemiological studies in this regard. The list of variables was also discussed with Prof Hawton in the initial stages of the study.

A meeting was held with Ms Cynthia Bonnici, managing psychologist at Ministry for Health, regarding local professional practice and policy surrounding suicide (personal communication, December 11, 2018). There appears to be a lack of formal suicide protocols in the mental health services, and the procedures following death by suicide vary according to the professional and the case.

A meeting was held with Inspector Charlot Casha, Chief Inspector of the Forensics Unit within the Malta Police Force, regarding the forensic and legal aspects surrounding suicide (personal communication, February 28, 2019). The process appears to be as follows: the police informs the magistrate of the death, following which a magisterial inquiry is opened and experts, such as pathologists, are appointed by the magistrate. The magisterial inquiry and police investigations therefore run as two parallel processes.

Meetings were held with Dr Mario Scerri, scene of crime officer and forensic expert in the courts of Malta, regarding determining the cause of death (personal communication, March 8, 2019). Dr Scerri gathers information regarding the history and the scene on-site, and then liaises with the pathologists in this regard. Moreover, in Dr Scerri's expert opinion, illicit drug overdoses are difficult to classify as intentional or accidental; and are therefore often classified as *fatal overdoses with undetermined intent*.

Reliability and Validity

Tests to assess the reliability and validity of the study could not be carried out due to the nature of the study. However, measures were taken to increase reliability and consistency by ensuring that the data collection was as accurate as possible; and by providing an in-depth and transparent account of each step of the study (Langdridge & Hagger-Johnson, 2009). Multiple sources of data were used in order to minimize measurement error, and any discrepancies were outlined (Boo & Froelicher, 2013). Moreover, face and content validity were increased by ensuring that the study measured that which it intended to measure (Bryman, 2012), and that the multiple factors surrounding the epidemiology of suicide were addressed by the study.

Despite these efforts, this study carries several limitations. These include missing and incomplete data, as well as different instruments and categorization used across the different

sources of data. Therefore, these limitations must be kept in mind, and definite claims about this study's reliability and validity cannot be made.

Ethical Considerations

Ethical framework. Principle ethics are based on the application of universal principles to ethical dilemmas (Beauchamp & Childress as cited in Bersoff, 2003). Various ethical principles have been outlined in the literature, some of which will be explored in the next section (Jordan & Meara, 2003). On the other hand, virtue ethics are based on character ideals in the development of ethical professionals (Meara, Schmidt, & Day, 1996). Rather than arguing for one approach over the other, it is more useful to take both approaches into account in evaluating which principles or virtues need to be prioritized in a particular situation (Bersoff, 2003). Therefore, given the nature of this study, this ethical framework was adopted, whereby ethical principles and professional virtues were both sought to be upheld, and were prioritized according to the presenting ethical issue.

Professional regulation. Before the start of the study, ethical clearance was sought from the University of Malta, using the Research Ethics and Data Protection Self-Assessment Form submitted to the Social Wellbeing Faculty Research Ethics Committee, in line with the university's Research and Ethics Review Procedures. Confirmation of the submission of this self-assessment can be found in Appendix H.

Ethical considerations were made throughout the study, in accordance with the Malta Psychology Profession Board's Code of Ethics and Conduct (2012) and the BPS's code of research ethics (2014). It was ensured that no harm took place throughout the study. It was also ensured that identifiable details would not be revealed, in order to maintain confidentiality (Langdridge & Hagger-Johnson, 2009).

Moreover, the following security measures were taken in order to protect the data: no files were taken out of the hospitals; case numbers were assigned from an early stage; electronic files were encrypted; electronic devices were equipped with password and antivirus protection; and devices and data were securely stored.

Additionally, steps to ensure ethical research were taken at various levels including the study design, data analysis, and reporting (Rosenthal, 2003). This included selecting an appropriate research design to address the research questions; presenting all the data including outliers; and appropriately representing the findings.

Legal regulation. Furthermore, authorization was obtained from the relevant authorities and gatekeepers for each source of data. They were each informed of the purpose of the study from the start, and no deception took place at any stage of the research process.

Firstly, the Request for Record Level Data application was submitted to the DHIR, in order to obtain access to the National Mortality Register. Secondly, the respective pathologists requested the Magistrate's permission for access the post-mortem records on my behalf. Thirdly, access to the medical records was obtained through Dr Anton Grech, MCH chairman; Mr Ivan Falzon, MDH CEO; and the Data Protection Office at the health informatics department at MDH. A copy of these authorizations can be found in Appendix I.

Conclusion

In conclusion, this chapter has delved into the research questions, the theoretical paradigm, and methodology which guided this study. Reliability and validity, as well as the relevant ethical considerations, were also explored in this chapter. The study's findings are presented in the next chapter.

Results

Introduction

The findings of the study are presented in this chapter. Preliminary considerations and data exploration are first outlined. Data analyses are then presented as follows: the first part of the analysis outlines the prevalence of suicide in the Maltese Islands between 1995 and 2018, as well as the descriptive analyses for each variable in the study. The second part presents the bivariate analyses carried out on selected variables using multiple statistical tests.

Preliminary Considerations

In this section, the preliminary considerations and first steps in analyzing the data are presented. These include the screening of the data, the examination of missing data, and the identification of outliers. The basic assumptions about the data, and how these informed the choice of tests used in this study, are also explored.

Screening the data. Prior to starting the analysis, the data were thoroughly screened for any errors (Dancey & Reidy, 2004). Visual inspection of histograms and box plots indicated that the variables contained data which were all within the possible range, confirming that no mistakes were made during the data entry.

Missing data. The pattern of missing data, coded as *999*, was examined both visually and by carrying out a missing value analysis. The data were missing not at random. The data for the demographic variables and most of the suicide related variables are outlined in Table 6. The missing data for these variables were due to missing information in the records used.

Table 6

Missing data

Variable	Available	Missing	Years
Gender	635	0	1995-2018
Age	635	0	1995-2018
Birth cohort	635	0	1995-2018
Marital status	559	76	1995-2018
Nationality	635	0	1995-2018
Residence	632	3	1995-2018
Employment status	467	168	1995-2018
Occupation	162	28	1995-2018
Year of suicide	635	0	1995-2018
Month	635	0	1995-2018
Season	635	0	1995-2018
Location of suicide	597	38	1995-2018
Locality of suicide	495	140	1995-2018
Method	635	0	1995-2018

The data for the psychiatric variables, adverse life events, and some of the suicide related variables are outlined in Table 7. The missing data for these variables were unavailable due to the lack of full sets of information for these variables in the records used. Therefore, only available data were entered.

When data were not available, they were left missing and entered as *999*, not entered as *no,* in order to maintain consistency. This was because of the possibility that the individual may have had that variable, without it being known in the records used. For example, when there was no information regarding whether the individual left a suicide note.

Furthermore, there were only a few cases for which the records indicated that the individual did not have a particular variable. For example, when the medical records indicated that the individual did not have a substance abuse problem. Given that these cases were few, and given the possibility of incomplete records, data in these cases were also left

missing and not entered as *no*, in order to provide as accurate a representation of reality as possible.

Table 7

Available data

Variable	Available	Years
Time	134	2014-2018
Suicide hotspots	46	2002-2018
Toxicology	59	2002-2018
Communication	56	2002-2018
Note	30	2002-2018
Mental illness	163	2002-2018
Mental illness type	217	2002-2018
Psychiatric medication	115	2002-2018
Psychiatric medication type	99	2002-2018
Contact with services	370	2002-2018
Psychiatric services type	151	2002-2018
Time since last contact	63	2014-2018
Psychiatric admission	318	2002-2018
Attempts	73	2002-2018
Attempts number	41	2002-2018
Attempts method	44	2002-2018
Substance abuse	85	2002-2018
Contact primary care	119	2002-2018
Physical condition	88	2002-2018
Physical condition type	81	2002-2018
Financial issues	16	2002-2018
Legal problems	35	2002-2018
Relationship problems	84	2002-2018
Loss of other	40	2002-2018
Abuse	7	2014-2018
Family history	25	2002-2018

Pairwise deletion was used in order to handle the missing data when conducting the analyses. Therefore, the cases with missing values were excluded from the analyses for which they had no data and were included in the analyses for which the data were available. This

was done in order to preserve the information available as much as possible, given the large amount of missing data for some of the variables.

Outliers. Upon screening the data, outliers were identified in the age variable. In the study, the outliers represented individuals of an older age who died by suicide and were a valid part of the population. Different schools of thought have presented different recommendations regarding whether to keep or remove outliers. The statistical analyses involving the age variable were carried out both with and without the outliers, in order to ascertain robustness of the results (Pituch & Stevens, 2016). With regards to the latter, the outlier values were transformed to the next highest non-outlier value (Field, 2013). The same results were obtained with and without outliers. Therefore, in line with Pituch and Stevens (2016)'s recommendations, given that the outliers did not lead to a misrepresentation of the majority, it was decided that the originality of the data would be preserved, and the outliers would be retained.

Normality of distribution. The age distribution was tested for normality by carrying out the Kolmogorov Smirnov test for gender and age, nationality and age, as well as age and suicide method. Both statistically significant ($p < .05$) and non-significant results was obtained on these tests, indicating that the age distribution was significantly different from a normal distribution for some of the variables, and similar to a normal distribution for other variables. A table with these results can be found in Appendix J.

However, the Kolmogorov Smirnov test has its limitations when used with large datasets. Therefore Field (2013) recommended visually examining the histogram and taking the population size into consideration, in order to make an informed decision about the extent of the non-normality. Following these recommendations, it was concluded that while the distribution was slightly skewed, the majority of the variables were normally distributed.

Homogeneity of variance. The homogeneity of variance between groups was tested by carrying out Levene's test, in order to ensure that the variance of one variable was stable at all levels of the other variable (Field, 2013). Non-significant ($p > .05$) results were obtained on this test for age and the respective variables, indicating that the variances in the groups were equal or homogeneous.

Choice of tests. In this section, the choice of statistical tests for the examination of both categorical and continuous variables is outlined. The way in which the basic assumptions about the data, presented above, informed the choice of parametric and non-parametric tests, is also described in this section.

Categorical variables. The data were explored in order to establish whether to use parametric or non-parametric tests in the analyses. Non-parametric tests are recommended for the analysis of categorical data; therefore, the chi-square test was used as it explores the relationship between two categorical variables. In this study, the following assumptions of the chi-square test were met: each individual contributed to only one cell of the contingency table, and less than 20% of the expected frequencies were below 5 (Field, 2013).

Contingency tables were created in order to examine the expected frequencies of the categorical data. These contained cells with expected counts below 5, thereby violating the test's second assumption. Therefore, in order to ensure that less than 20% of the expected frequencies were below 5, the categories *suicide method* and *nationality* were regrouped, as described in Appendix K.

Continuous variables. The assumptions required to conduct parametric tests were evaluated in order to select the appropriate tests for the analysis of continuous data (Field, 2013). The following three assumptions were met: the data were measured at interval levels; the observations were independent of each other; and the homogeneity of variance was

established. The fourth assumption of parametric tests is the normal distribution of data. As described in the respective section above, the distribution was slightly skewed. However, according to Tabachnick and Fidell (2007), parametric tests can be used even when the data do not appear to be normally distributed. Therefore, the one-way ANOVA and independent samples *t*-test were used in this study, as they are considered robust tests against the normality assumption, particularly with large sizes (Pallant, 2007).

Prevalence of Suicide

The study's findings will now be presented, and this section addresses the first research question regarding the prevalence of suicide. In the initial stages of data collection, 708 individuals were identified. However, as described in the Method chapter, 73 of these cases were either illicit drug overdoses with undetermined intent, or other unclear cases, and were therefore omitted from the study. Therefore, in this study, the total number of suicides from 1995 to 2018 in the Maltese Islands was 635. The prevalence rates calculated in this study can be found in Appendix L.

Univariate Analyses

This section presents the descriptive analyses of each variable in the following order: demographic variables, suicide-related variables, psychiatric variables, and adverse life events and other variables. Therefore, this section answers the study's second research question: to explore the frequency of each of the variables in the study's population.

Demographic variables. Descriptive analyses for the following demographic variables are presented in this section: gender differences, age distribution, birth cohort, marital status, nationality, residence, employment status, and occupation.

***Gender*.** The population in this study consisted of 509 males (80.2%) and 126 females (19.8%).

Age. The average age was 46. The range was 84, whereby the minimum age was 14 and the maximum age was 98. The standard deviation (*SD*) was large (17.223) as the ages varied considerably, as presented in Figure 3.

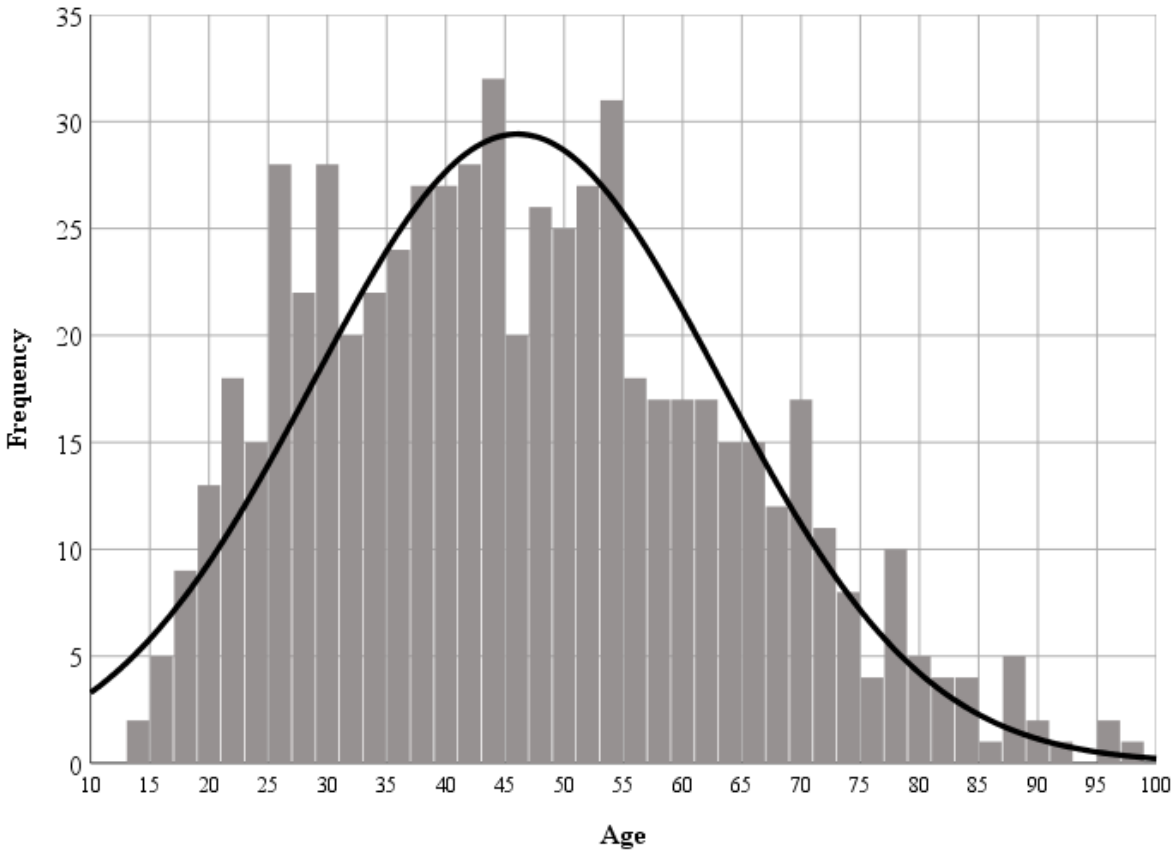

Figure 3. Age histogram.

Furthermore, the ages of the individuals in the study were categorized as follows: 128 individuals (20.2%) were 14 to 29 years old, 252 individuals (39.7%) were 30 to 49 years old, 187 individuals (29.5%) were 50 to 69 years old, and 68 individuals (10.7%) were 70 to 98 years old.

Birth cohort. The birth cohort with the highest number of suicides was 1960 to 1969 (20.4%), followed closely by 1970 to 1979 (19.8%). These results are presented in Figure 4.

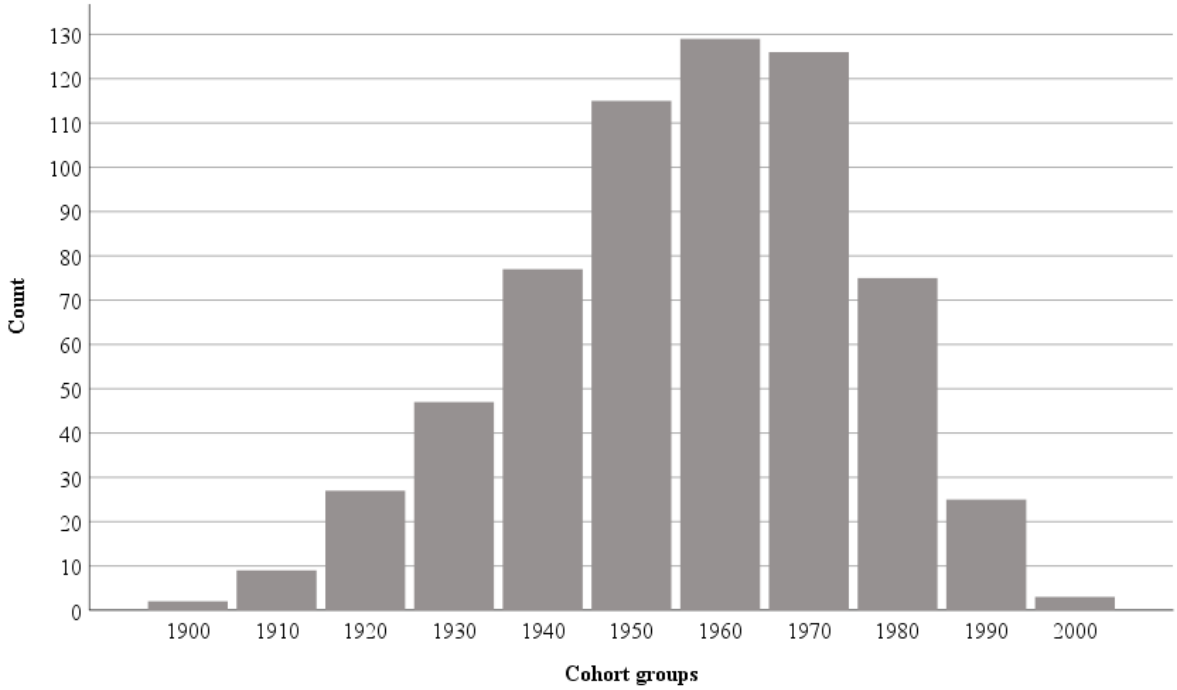

Figure 4. Birth cohort bar graph.

***Marital status*.** Of the 559 individuals for whom this variable was available, 42.0% (*n* = 235) were single, 46.5% (*n* = 260) were married, 4.7% (*n* = 26) were widowed, and 6.8% (*n* = 38) were separated.

***Nationality*.** Of the total 635 individuals, 83.1% (*n* = 528) had a local nationality and 16.9% (*n* = 107) had a foreign nationality. More specifically, 80.3% (*n* = 510) were Maltese and 2.8% (*n* = 18) were Gozitan.

***Residence*.** Of the 632 individuals for whom this variable was available, 93.4% (*n* = 590) were residents and 6.6% (*n* = 42) were not residents. More specifically, 19.0% resided in the Southern Harbour region, 28.5% resided in the Northern Harbour region, 15.7% resided in the South Eastern region, 11.7% resided in the Western region, 15.3% resided in the Northern region, and 3.2% resided in the Gozo and Comino region. This is represented visually using a map of the Maltese Islands in Figure 5.

Figure 5. Residence map.

***Employment status*.** Of the 467 individuals for whom this variable was available, 40.7% (*n* = 190) were employed, 18% (*n* = 84) were unemployed, 26.1% (*n* = 122) were pensioners, 2.1% (*n* = 10) were boarded out or unable to work, 8.6% (*n* = 40) were homemakers, and 4.5% (*n* = 21) were students.

***Occupation*.** The occupations of 162 of the individuals in the study are presented in Table 8. Technicians or associate professionals and elementary occupations were the two most common occupational categories amongst this population.

Table 8

Occupation

Occupation category	*n*	%
Armed forces	1	0.6
Legislators, senior officials, managers	11	6.8
Professionals	14	8.6
Technicians, associate professionals	34	21.0
Clerks	3	1.9
Service and sales workers	20	12.3
Agricultural and fishery workers	3	1.9
Craft and trades	27	16.7
Plant and machine operators	15	9.3
Elementary occupations	34	21.0
Total	162	100.0

Suicide-related variables. This section presents the descriptive analyses for the suicide-related variables. These variables include the following: the year, month, season, and time of suicide; the location, locality of suicide, and suicide hotspots; the suicide method; toxicology post-mortem exam results; as well as the communication of suicidal ideation or plan, and suicide notes.

***Year of suicide*.** As displayed in Figure 6, the year with the highest number of suicides was 2015 (6.3%), while 1998 was the year with the lowest number of suicides (1.9%). The regression trend line indicates that there was a statistically significant ($p < .001$) increase in suicides over time ($b = 0.660$).

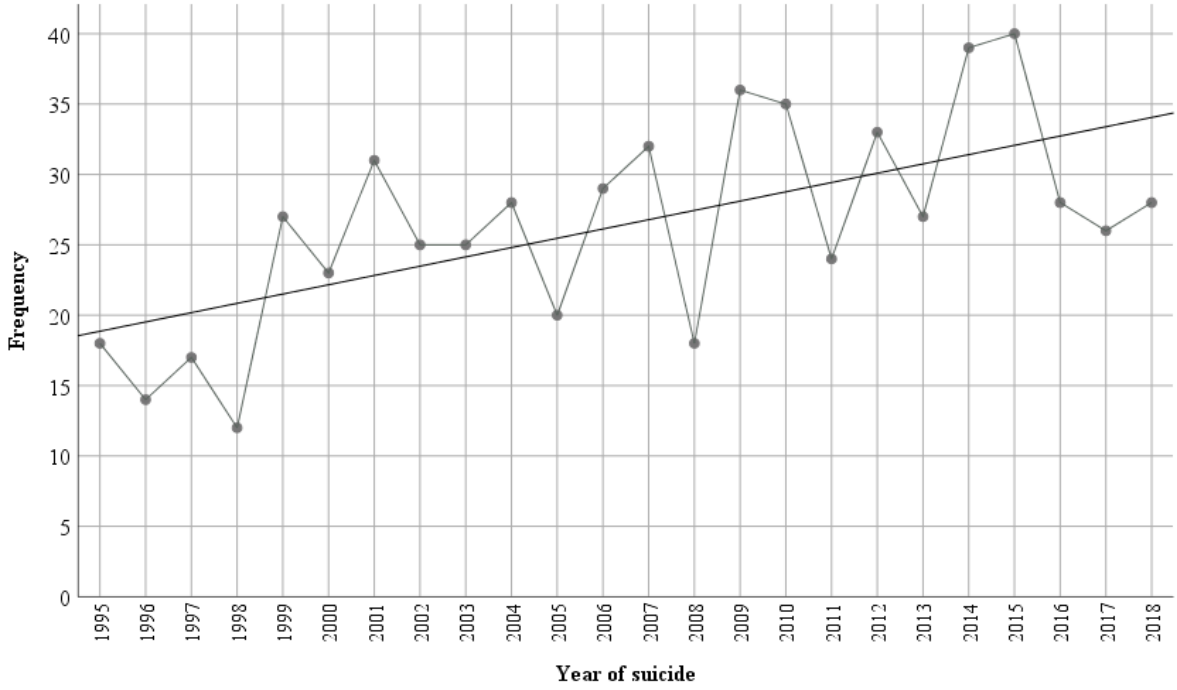

Figure 6. Year of suicide scatterplot.

Month of suicide. As indicated in Figure 7, May was the month with the highest number of suicides (11.0%), while October was the month with the lowest number of suicides (5.5%).

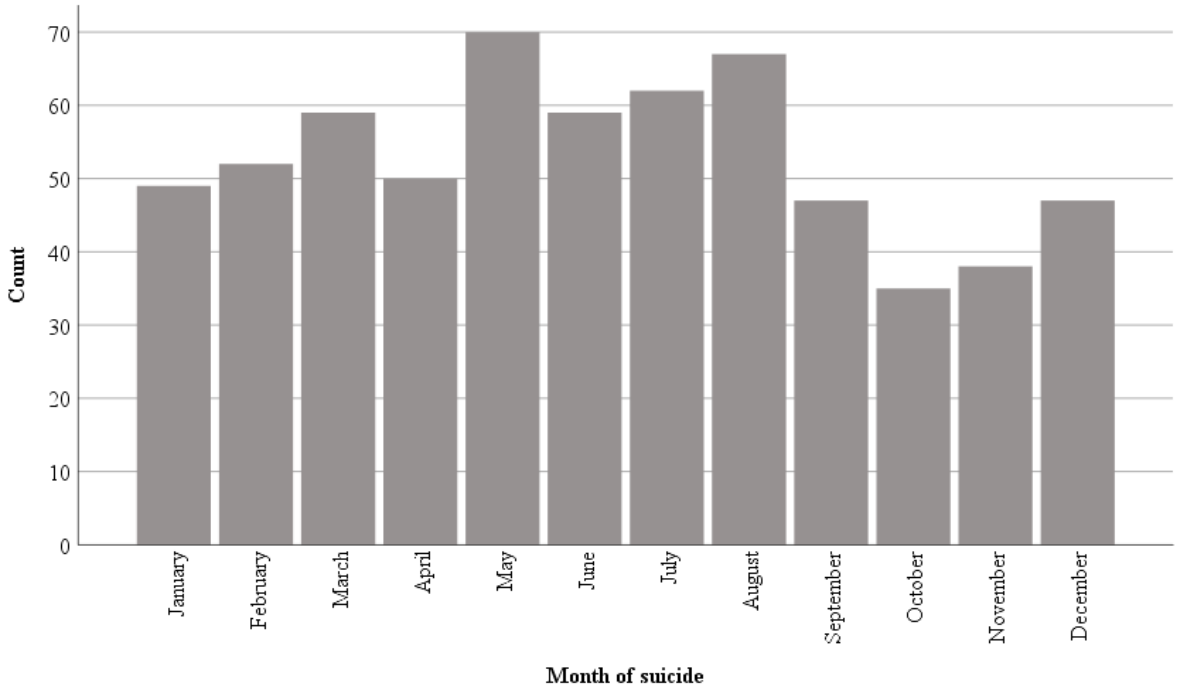

Figure 7. Month of suicide bar graph.

***Season*.** Of the total 635 individuals, 23.1% (*n* = 147) of the suicides were in Winter, 30.4% (*n* = 193) were in Spring, 28.2% (*n* = 179) were in Summer, and 18.3% (*n* = 116) were in Autumn. Therefore, the season with the highest suicide rates was Spring.

***Time of suicide*.** Of the 134 individuals for whom this variable was available, the highest number of suicides took place at 10:00 (8.2%) and 17:00 (8.2%), while the lowest number took place at 03:00 (0.0%).

The time of suicide was further categorized in 4-hour periods, as displayed in Figure 8. Most suicides took place in the time period between 16:00 and 19:59.

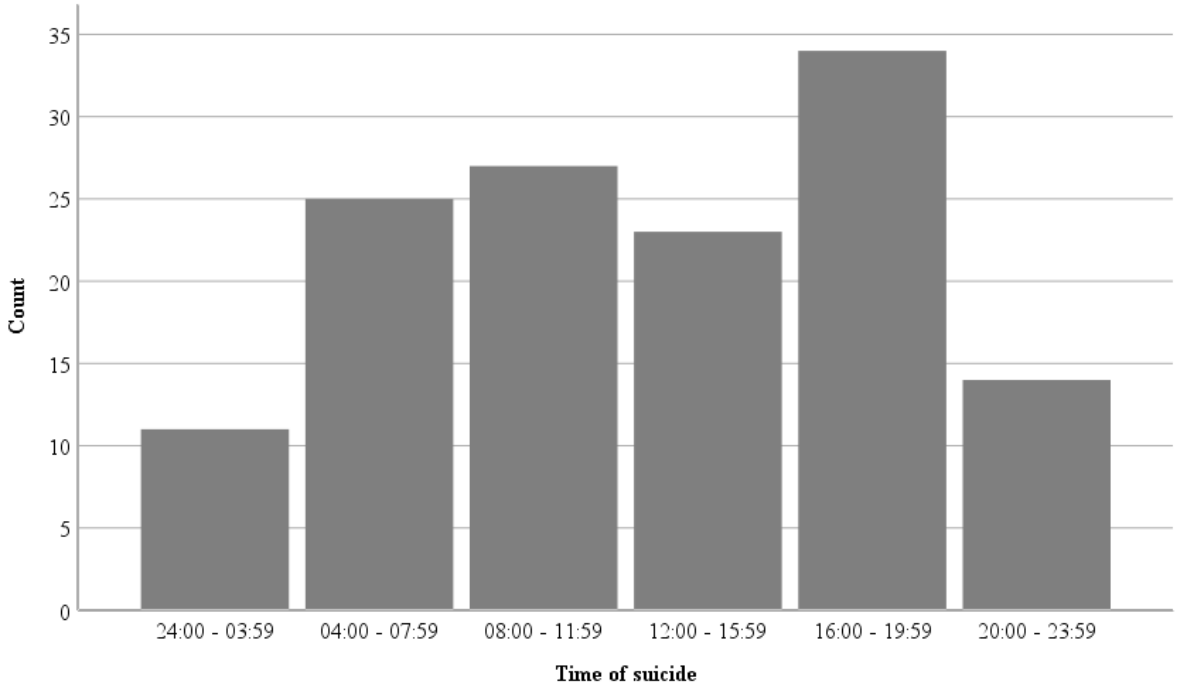

Figure 8. Time of suicide bar graph.

***Location of suicide*.** The locations of suicide were available for 597 individuals and are presented in Table 9. The most common location of suicide was at the individual's home.

Table 9

Location of suicide

Location	*n*	%
At home	284	47.6
Residential institution	9	1.5
General hospital	14	2.3
Psychiatric hospital	5	0.8
Correctional facilities	10	1.7
Outside or not home	254	42.5
At sea	21	3.5
Total	597	100.0

***Locality of suicide*.** Of the 495 individuals for whom this variable was available, the locality of suicide was as follows. 23.8% were in the Southern Harbour region, 25.1% in the Northern Harbour region, 16.8% in the South Eastern region, 12.3% in the Western region, 17.8% in the Northern region, and 4.2% in the Gozo and Comino region. This is represented visually in Figure 9.

Figure 9. Locality of suicide map.

***Suicide hotspots*.** Suicide hotspot locations were identified for 46 individuals, as presented in Table 10.

Table 10

Suicide hotspot locations

Hotspot location	*n*	%
Dingli cliffs	12	26.1
Mosta bridge	12	26.1
L-Ahrax Mellieha	4	8.7
Lascaris ditch Valletta	12	26.1
St James ditch Valletta	3	6.5
Upper Barrakka Valletta	3	6.5
Total	46	100.0

Suicide method. The suicide methods are presented in Table 11. The most common suicide method was hanging, strangulation, or suffocation.

Table 11

Suicide method

Suicide method	*n*	%
Self-poisoning: Medication	44	6.9
Self-poisoning: Illicit drugs	13	2.0
Self-poisoning: Gases	24	3.8
Self-poisoning: Chemicals	2	0.3
Self-poisoning: Pesticides	2	0.3
Hanging, strangulation, or suffocation	260	40.9
Drowning or submersion	28	4.4
Firearm	68	10.7
Sharp object	8	1.3
Jumping from a high place	181	28.5
Other	5	0.8
Total	635	100.0

***Toxicology post-mortem exam*.** Of the 59 individuals for whom this variable was available, the toxicology reports indicated that 13.6% (n = 8) had high blood levels of alcohol, 30.5% (n = 18) had high blood levels of illicit drugs, and 55.9% (n = 33) had high blood levels of medication at the time of death.

***Communication of suicidal ideation or plan*.** Communication of suicidal ideation or a suicide plan was identified for 56 individuals in the time period for which the variable was available.

***Suicide note*.** Suicide notes was identified for 30 individuals in the time period for which the variable was available.

Psychiatric variables. This section presents the descriptive analyses for the psychiatric variables. These variables include the following: mental illness, psychiatric medication, contact with psychiatric services, history of suicide attempts, and substance abuse.

***Mental illness*.** The presence of a mental illness was identified for 163 individuals (33%) in the time period for which the variable was available.

***Mental illness diagnosis*.** The types of mental illness identified are presented in Table 12. It may be noted that the discrepancy between the total number of cases in *mental illness* and *mental illness type* was attributed to missing information regarding *mental illness type*, as well as the fact that *undiagnosed depression* was not classified in the *mental illness* variable.

Table 12

Type of mental illness

Mental illness	*n*	%
Mood disorders: Depressive	60	27.6
Schizophrenia, schizotypal and delusional disorders	38	17.5
Mood disorders: Bipolar	11	5.1
Neurotic disorders: Anxiety	10	4.6
Personality disorders	9	4.1
Psychoactive substance use	18	8.3
Dementias	2	0.9
Undiagnosed depression	69	31.8
Total	217	100.0

Psychiatric medication. The prescription of psychiatric medication was identified for 115 individuals (23%) in the time period for which this variable was available.

Type of psychiatric medication. Of the 99 individuals for whom this variable was available, 44.4% (*n* = 44) were prescribed antidepressants, 28.3% (*n* = 28) were prescribed antipsychotics, 5.1% (*n* = 5) were prescribed mood stabilizers, and 22.2% (*n* = 22) were prescribed antianxiety medication. The count of stimulant medication prescription was 0.

Contact with psychiatric services. Of the 370 individuals for whom this variable was available, 57.0% (*n* = 211) had had contact with psychiatric services, and 43.0% (*n* = 159) had not had contact with psychiatric services.

Type of contact with psychiatric services. The type of psychiatric services with which the individuals had contact are presented in Table 13. No admissions to the Gozo General Hospital psychiatric services were identified.

Table 13

Type of psychiatric service

Service	*n*	%
MCH	62	41.1
PU	18	11.9
POP	10	6.6
HC	4	2.6
AE	8	5.3
Multiple	49	32.5
Total	151	100.0

***Time since last contact with psychiatric services*.** The time since last contact with psychiatric services is presented in Table 14. Most of the individuals for whom this variable was identified had had contact with psychiatric services one week or less before the suicide.

Table 14

Time since last contact with psychiatric services

Time	*n*	%
At time	6	9.5
<1 week	16	25.4
<1 month	12	19.0
<3 months	15	23.8
<6 months	4	6.3
<1 year	6	9.5
>1 year	4	6.3
Total	63	100.0

***Admission to psychiatric ward*.** Of the 318 individuals for whom this variable was available, 42.5% (*n* = 135) had been admitted to a psychiatric ward and 57.5% (*n* = 183) had not been admitted to a psychiatric ward.

***History of suicide attempts*.** A history of suicide attempts was identified for 73 individuals (15%) in the time period for which this variable was available.

***Number of suicide attempts*.** Data regarding the number of previous suicide attempts were identified for 41 individuals. The average number of suicide attempts was 3. The range was 6, whereby the maximum number was 7 and the minimum number was 1. The SD was small (1.445) as the numbers did not vary considerably.

***Method of suicide attempts*.** The methods used in previous suicide attempts, for individuals for whom this variable was available, are presented in Table 15.

Table 15

Method of prior suicide attempts

Method of suicide attempts	*n*	%
Self-poisoning: Medication	14	31.8
Hanging, strangulation, or suffocation	4	9.1
Sharp object	3	6.8
Jumping from a high place	7	15.9
Other	1	2.3
Multiple methods	15	34.1
Total	44	100.0

***Substance abuse*.** Of the 75 individuals for whom this variable was available, 52.0% (*n* = 39) had an illicit drug use problem, and 48.0% (*n* = 36) had an alcohol use problem.

Adverse life events and other variables. In this section, the number of individuals for whom data regarding adverse life events and other variables were available, are presented in Table 16.

Table 16

Adverse life events and other variables

Variable	*n*	Category	*n*	%
Contact with primary care	119			
Physical condition	88			
		Cancer	13	14.8
		Circulatory system	9	10.2
		Huntington	5	5.7
		Stroke	4	4.5
		Seizures	6	6.8
		Diabetes	6	6.8
		Injury	17	19.3
		Pain	5	5.7
		Other	16	18.2
		Unknown	7	8.0
Financial difficulties	16			
Legal problems	30			
		Present incarceration	10	33.3
		Past incarceration	6	20.0
		Other legal issues	14	46.7
Relationship problems	84			
		Marital problems	20	23.8
		Marital breakup	40	47.6
		Relationship problems	12	14.3
		Relationship breakup	12	14.3
Loss of other	40			
		Partner	23	57.5
		Child	3	7.5
		Parent	8	20.0
		Other	6	15.0
History of abuse	7			
		Sexual abuse	3	42.9
		Domestic violence	2	28.6
		Bullying	2	28.6
Family history	25			

Bivariate Analyses

This section of the Results chapter presents the bivariate analyses which were carried out using statistical tests, in order to answer the third part of the study's research questions, namely, to explore gender differences, age differences, and trends over the years. The variables selected for bivariate analyses did not have large amounts of missing data, in order to ensure the validity of the statistical analyses.

Gender. Bivariate analyses for the following variables are presented in this section: gender and age, gender and marital status, gender and suicide method, and gender and psychiatric services.

***Gender and age*.** The simple box plot in Figure 10 demonstrates the distribution of ages for males and females. The median age for males was 44 and the median age for females was 45. Moreover, the minimum age was the same for both males and females, while the maximum age was higher for males than for females.

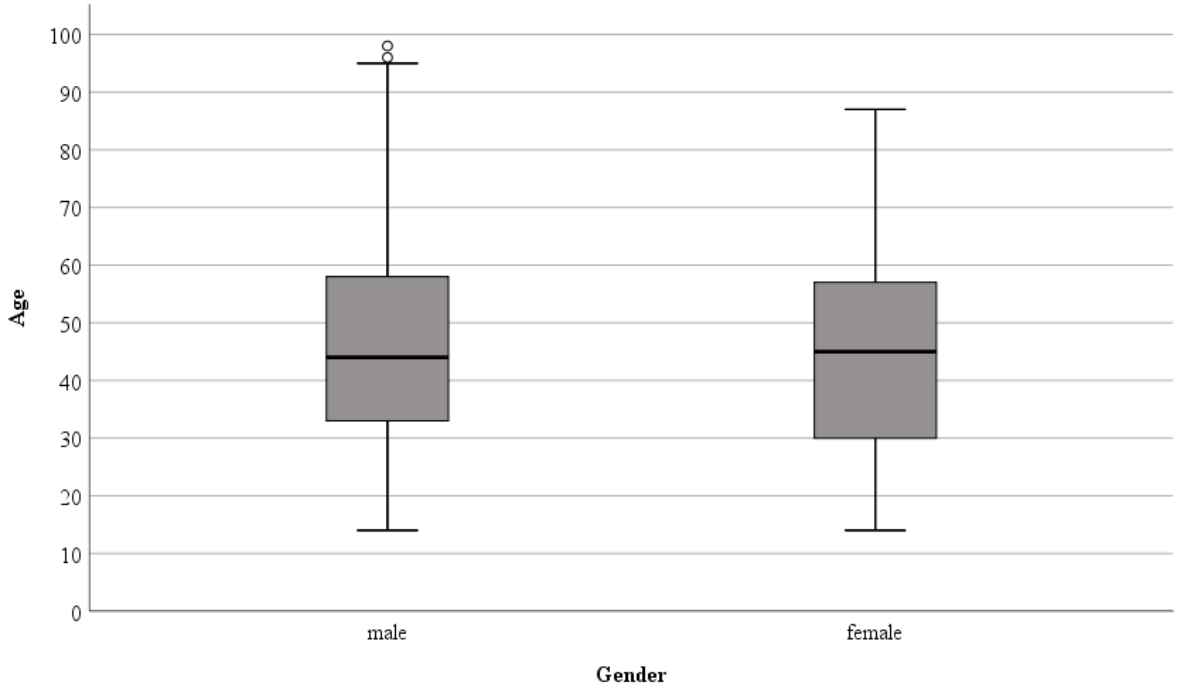

Figure 10. Gender and age box plots.

An independent samples *t*-test was conducted in order to compare the mean ages between males and females. On average, males had a greater mean age (M = 46.30, SE = 0.77), than females (M = 44.98, SE = 1.50). However, this difference was not statistically significant $t(633) = 0.77$, $p = .439$, indicating that there was no difference in age between males and females. Moreover, it represented almost no effect $r = -.031$.

In keeping with parametric tests, mean values were presented above. However, median values were also presented, given that they are less influenced by outliers or skewness, and therefore provide a better measure of central tendency (Field, 2013). This may explain the difference in the values, given that the median age was greater for females, while the mean age was greater for males. However, as indicated by the independent samples *t*-test, the gender difference in age was not statistically significant.

Gender and marital status. The gender differences in marital status are presented in Table 17.

Table 17

Gender and marital status crosstabulation

	Gender				Total	
	Male		Female			
Marital status	*n*	%	*n*	%	*n*	%
Single	193	43.6	42	36.2	235	42.0
Married	207	46.7	53	45.7	260	46.5
Widowed	9	2.0	17	14.7	26	4.7
Separated	34	7.7	4	3.4	38	6.8
Total	443	100.0	116	100.0	559	100.0

A chi-square test was conducted in order to test the statistical significance of these gender differences in marital status. There was a significant association between gender and

marital status $\chi^2(3) = 35.12$, $p < .001$. Moreover, it represented a medium sized effect V = .251.

Gender and suicide method. The gender differences in suicide method are presented in Figure 11. As indicated in the respective section on preliminary considerations, *method* was regrouped for these bivariate analyses.

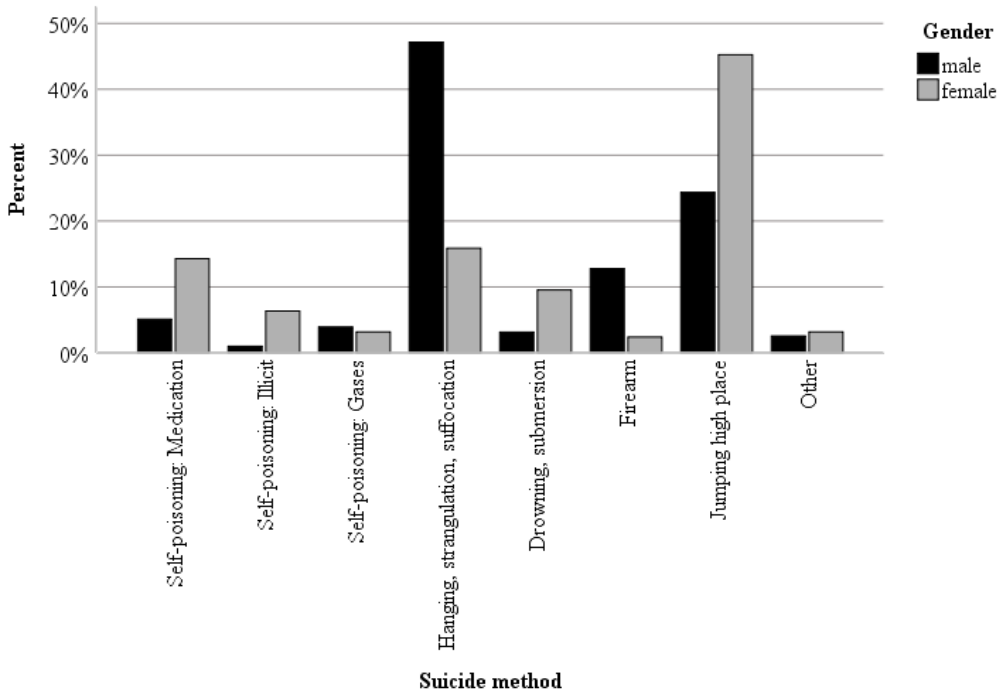

Figure 11. Gender and suicide method clustered bar graph.

A chi-square test was conducted in order to test the statistical significance of these gender differences in suicide method. There was a statistically significant association between gender and method $\chi^2(7) = 85.86$, $p < .001$. Moreover, it represented a medium sized effect V = .368.

Gender and psychiatric services. A crosstabulation of gender and psychiatric services indicated that a larger percentage of females (74.0%) than males (52.9%) had had contact with psychiatric services. A larger percentage of males (47.1%) than females (26.0%) had not had contact with psychiatric services.

A chi-square test was conducted in order to test the statistical significance of these gender differences in the use of psychiatric services. There was a significant association between gender and psychiatric services $\chi^2(1) = 10.66$, $p < .001$. However, it represented a small sized effect V = .170.

Age. This section presents the bivariate analysis for age and suicide method, in order to explore the age distribution.

Age and suicide method. The simple box plots in Figure 12 demonstrate the distribution of ages for the different suicide methods. The mean and median ages were lowest for self-poisoning by gases and highest for drowning or submersion.

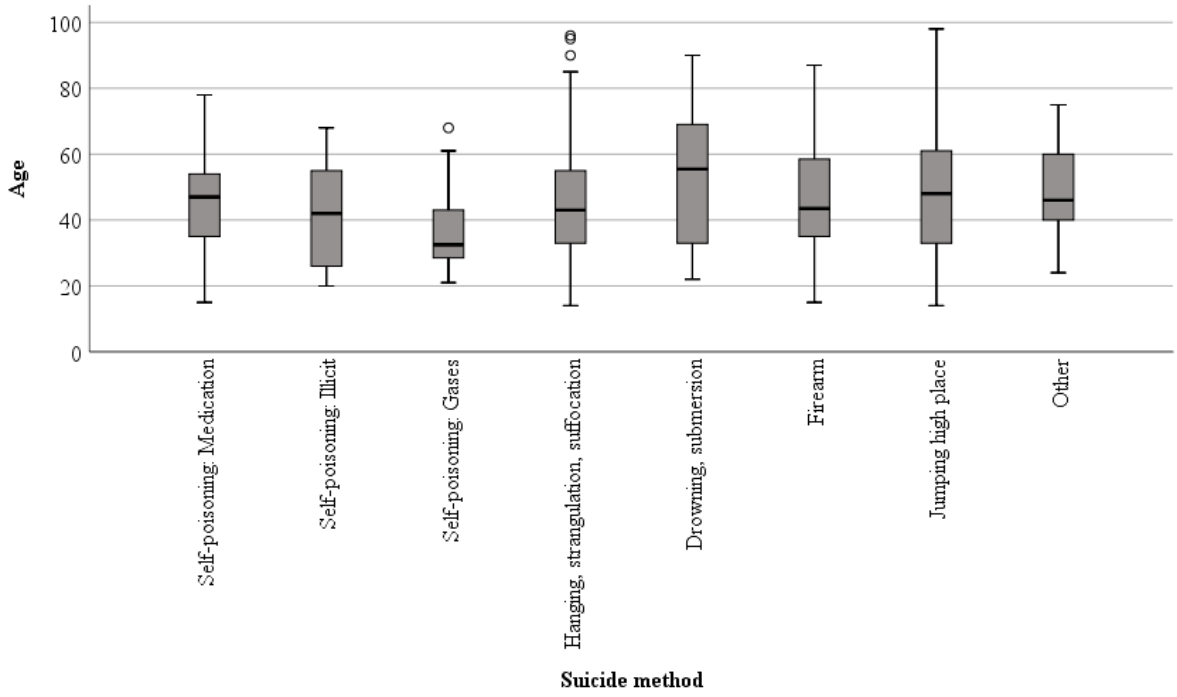

Figure 12. Age and suicide method box plots.

A one-way ANOVA was conducted in order to compare mean ages between the different suicide methods. There was a statistically significant effect of age on method, $F(7, 627) = 2.10$, $p = .042$, 95% CI. However, it represented a small effect $r = .096$.

In line with Field (2013)'s recommendations, the Games Howell post hoc procedure was selected, given the uncertainty of knowing whether population variances are equivalent. This procedure indicated that there were statistically significant differences at 95% CI between self-poisoning by gases and drowning or submersion (p = .032), as well as between self-poisoning by gases and jumping from a high place (p = .013), with self-poisoning by gases having a younger mean age.

Year of suicide. This section presents the simple regression analyses for the following variables, in order to explore the suicide trends over the years: year of suicide and gender, year of suicide and age, and year of suicide and suicide method.

***Year of suicide and gender*.** The scatterplot in Figure 13 indicated an increase in the number of male suicides over time and no increase in the number of female suicides. The year of suicide made a statistically significant contribution (p < .001) to predicting male suicides, whereby every 3 years, the number increased by 2 (b = 0.660). However, the year of suicide did not make a significant contribution (p = .992) to predicting female suicides, whereby the increment was negligible (b = 0.001).

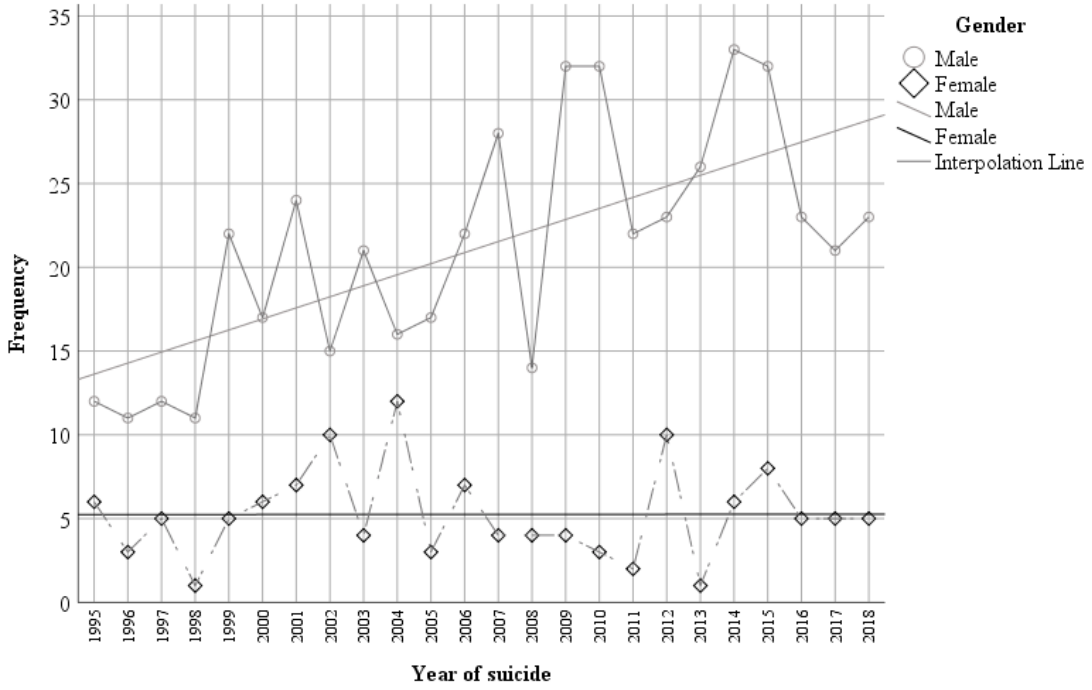

Figure 13. Year of suicide and gender scatterplot.

***Year of suicide and age*.** The scatterplot in Figure 14 indicated an increase in the number of suicides over time for the age groups 30 to 49 and 50 to 69 years old. However, there was a negligible increase in the number of suicides for the age groups 14 to 29 and 70 to 98 years old.

The year of suicide made a statistically significant contribution ($p = .020$) to predicting suicides in the 30 to 49 age group, whereby every 4 years, the number increased by 1 ($b = 0.277$). The year of suicide made a significant contribution ($p < .001$) to predicting suicides in the 50 to 69 age group, whereby every 3 years, the number increased by 1 ($b = 0.303$). However, the year of suicide did not make a significant contribution ($p = .557$) to predicting suicides in the 14 to 29 age group, whereby the increment was negligible ($b = 0.048$). The year of suicide did not make a significant contribution ($p = .505$) to predicting suicides in the 70 to 98 age group, whereby the increment was negligible ($b = 0.033$).

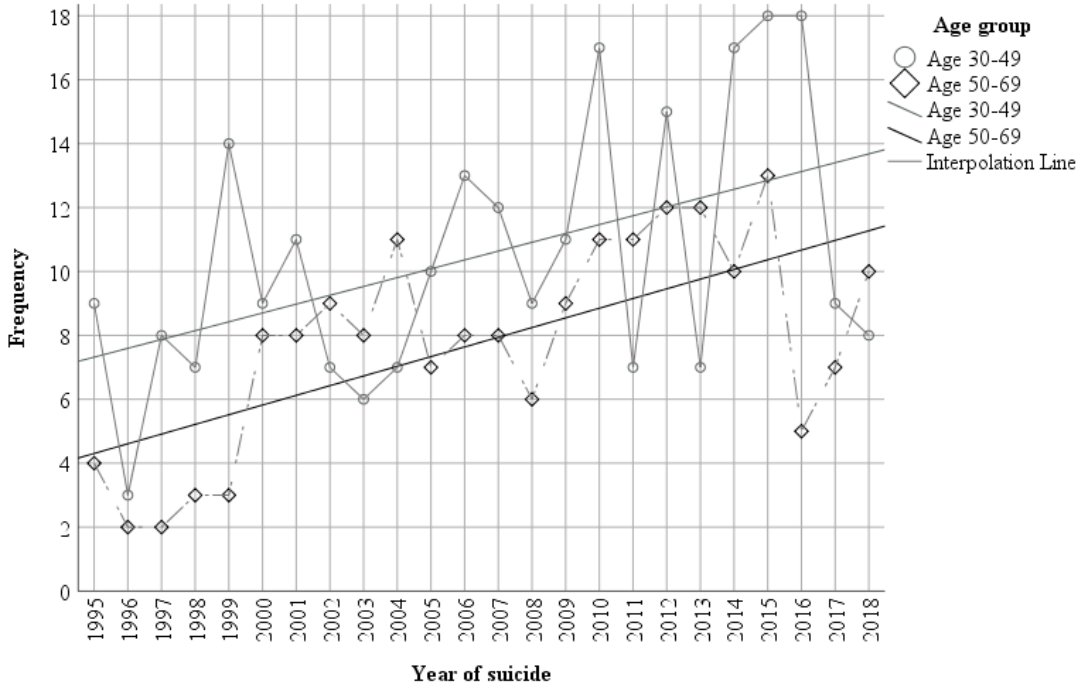

Figure 14. Year of suicide and age scatterplot.

***Year of suicide and suicide method*.** The scatterplot in Figure 15 indicated an increase in the number of suicides by hanging, strangulation, or suffocation, over time. However, the changes over time were negligible and non-significant for the other suicide methods, namely self-poisoning by medication (p = .080), illicit drugs (p = .308), and gases (p = .308), drowning or submersion (p = .712), firearms (p = .611), jumping from a high place (p = .656), and other methods (p = .308). Therefore, the year of suicide only made a statistically significant contribution (p < .001) to predicting suicide by hanging, strangulation, or suffocation, whereby every 2 years, the number increased by 1 (b = 0.560).

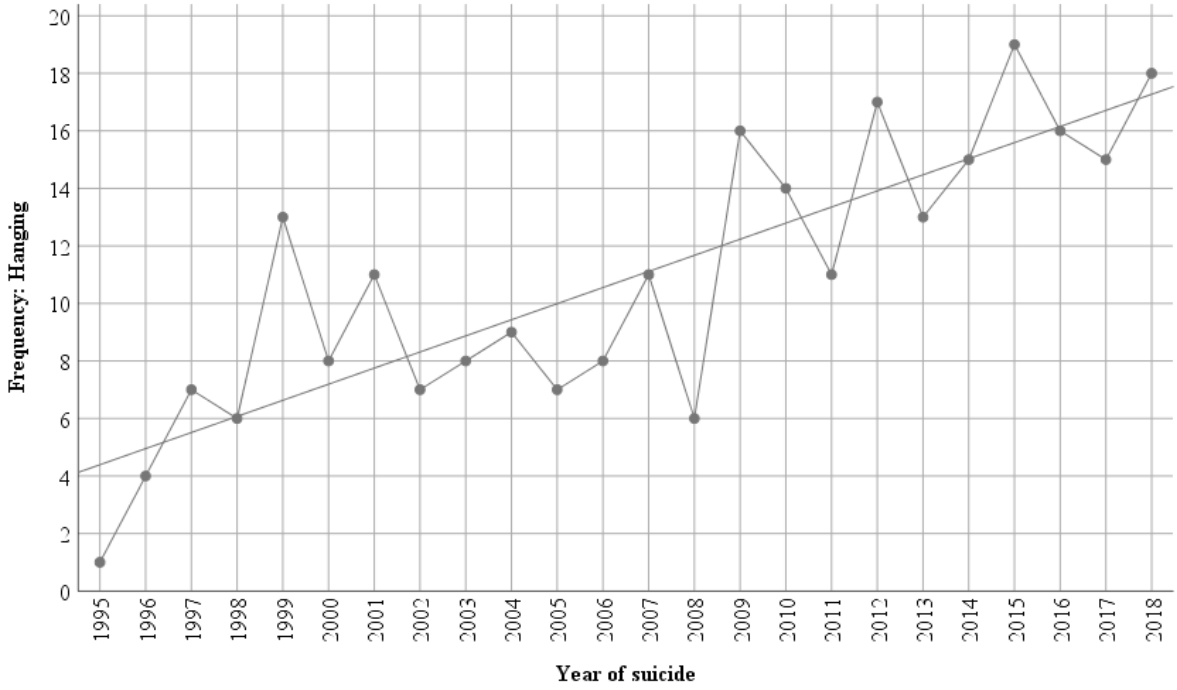

Figure 15. Year of suicide and hanging method scatterplot.

Conclusion

This chapter has explored the data and presented the findings of the study. An increasing suicide trend was found over the study's 24-year period. Hanging was the most commonly used suicide method, followed by jumping. A heightened suicide risk was identified for males, individuals aged 30 to 49, as well as single or separated, and unemployed individuals or pensioners, amongst other variables. In the next chapter, the study's findings will be discussed in terms of the existing literature, as well as how the local context compares to the international scenario.

Discussion

Introduction

In this chapter, the findings that were presented in the previous chapter are discussed in terms of this study's research hypotheses, the existing literature, and the local context. The implications of the findings are also explored. The first part of the chapter addresses the overall prevalence of suicide in the local context. In the second part of the chapter, the demographic, suicide-related, psychiatric, adverse life events and other variables are discussed respectively. For the purpose of this chapter, some related variables are discussed conjointly.

Prevalence of Suicide

In this section, the prevalence of suicide is discussed in terms of the local context, as well as the international scenario. Over the 24-year period in this study, the average suicide rate in the Maltese Islands was similar to the WHO (2014) estimates of 6.0 per 100,000 population (Appendix L). The annual global age-standardized suicide rate is 11.4 per 100,000 population (WHO, 2014). Suicide rates appear to be higher in high-income countries such as Malta, than in low or middle-income countries (WHO, 2013b; 2014). However, Mediterranean countries have overall lower rates of suicide than other European countries (Chishti et al., 2003; Helema et al., 2014).

When interpreting the findings, it is important to keep in mind that in the Maltese Islands, suicide appears to be under-reported, which may lead to difficulties in determining prevalence (DHIR, 2013). Under-reporting has been attributed to religious beliefs and sanctions (Goldney, 2010); social pressures (Krug et al., 2002); the sensitivity of suicide in the family and community (WHO, 2014); as well as underlying stigma and shame (Crosby et al., 2011; Krug et al., 2002). Locally, religion (O'Reilly Mizzi, 1994; Tabone, 1994),

community expectations (Clark, 2012; Giordano, 2005), and shame (Darmanin Kissaun, 2017) appear to have a powerful impact, and may therefore contribute to the under-reporting of suicide.

Furthermore, the misclassification of suicide has been attributed to variations in how deaths are determined (Goldney, 2010; Krug et al., 2002; Pritchard & Hansen, 2015; WHO, 2014). In the local context, one of the most apparent limitations is the classification of illicit drug overdoses, given difficulties in determining intent, and a lack of consensus amongst professionals. Other limitations include determining the cause of death when bodies are found in a state of putrefaction; unsolved or pending cases; and other misclassification errors.

According to Satariano and Curtis (2018), psychosocial wellbeing in the Maltese Islands is strongly influenced by wider cultural and social determinants, including norms regarding the roles of the extended family, traditional attitudes towards the marital institution, family honour, gender roles, as well as religious beliefs. Furthermore, while there has been a gradual shift from a traditional to a more modern culture, underlying values appear to persist.

One of the factors which may shed light on the local suicide rates is the relational orientation. The Maltese Islands are a familialistic country with high family support (Abela, Farrugia, Vella, & DeGiovanni, 2016), tight kinship bonds (Clark, 2012), and durable relationships (Sultana & Baldacchino, 1994). While the influence of Western individualistic culture is increasing, the emphasis on interdependency is still present (Darmanin Kissaun, 2016). These characteristics may serve as both protective factors for suicide given the high level of support; as well as risk factors.

There is a lack of consensus regarding whether a culture can be pathogenic, however, according to Darmanin Kissaun (2016), the local socio-cultural history and dynamics may interfere with psychological health. While the strong community feeling (Boissevain, 1993)

may be positive, it may also lead to shame or social exclusion (Darmanin Kissaun, 2017; Giordano, 2005) for those who breach convention and deviate from the group; with far-reaching consequences on the social bond (Clark, 2012).

Another fundamental component of the local community is religion (Tabone, 1994). According to Hsieh (2017), religious participation has been protective against suicide in some regions of the world, but a possible risk factor in other regions. Furthermore, such factors are contingent on personal characteristics and socio-geographical conditions, which may explain variation within the local context (Satariano & Curtis, 2018).

Similarly, shame may be both a protective and risk factor for suicide. As in most Mediterranean cultures, the code of honour and shame is strong in the Maltese Islands (O'Reilly Mizzi, 1994). This includes the sense of inherent defectiveness associated with the religious belief in original sin and atonement. Moreover, the islands' small size and architectural layout, linguistic features, social visibility and gossip networks, and multiple role relationships, make inhabitants more vulnerable to shaming (Clark, 2012; Darmanin Kissaun, 2017; O'Reilly Mizzi, 1994). The discussion of variables presented in the next sections will shed further light on the local scenario and its implications for suicide.

Demographic Variables

In this section, the findings regarding the multiple demographic variables will be discussed. The findings for these variables are compared to general population statistics in order to be able to make appropriate interpretations. These are displayed in further detail in Appendix M. A limitation of these comparisons is that they were carried out on one year in the general population, and not the full 24-year period used in this study.

Gender. The population in this study was made up of four times as many males as females. On the other hand, in 2017, the local general population consisted of an almost equal

number of males and females (NSO, 2019). Therefore, the gender difference in this study reflects gender differences in suicide and is not attributable to gender differences in the general population. This finding is consistent with international studies, which have reported significantly higher suicide rates for males than females, in most cultural groups (WHO, 2014). Despite this overall trend, there are variations in the gender disparity across different countries and regions (Langhinrichsen-Rohling et al., 2009). The local male to female ratio in this study is similar to that of high-income countries, which was 3.5, as opposed to 1.6 in low-income countries in 2012 (WHO, 2013b).

Cultural traits of individualism and masculinity have been linked to a higher prevalence of male suicide (Webster Rudmin et al., 2003). This may shed light on the local context, where social norms may contribute to less emotional expression amongst males. Furthermore, in the Maltese Islands, the maternal influence and "kin-centered female networks" are strong; and may lead to a tendency to treat other groups, including father figures, as outsiders (Di Lorenzo as cited in Darmanin Kissaun, 2016, p. 65). This may therefore contribute to reduced social support for males when compared to females.

Gender differences have also been associated with suicide methods, as well as help-seeking behaviour (WHO, 2014), each of which will be explored in the respective sections below. Moreover, internationally, gender differences have also been understood in terms of alcohol consumption rates (WHO, 2014). While alcohol intoxication will be briefly discussed in the respective section below, the data sources for this variable were limited, and therefore could not be explored in terms of gender differences in this study.

***Gender and age*.** Given the international literature (Snowdon et al., 2017; Varnik et al., 2008), it was expected that males would have an older average age than females. However, this hypothesis was not supported, as the gender difference in age was not

statistically significant in this study. A tentative explanation for this finding may be the supportive social conditions for older adults in the local context (Snowdon et al., 2017). Such age-related factors are explored further in the respective section below. Nonetheless, further research would be needed in order to gain a deeper understanding into the meaning of these gender differences in the local context.

Gender and marital status. The hypothesis that males are at higher risk of suicide following separation and widowhood, was only partially supported. When compared to the general population in 2011, in this study, a larger percentage of males were separated and a larger percentage of females were widowed (NSO, 2014). In the literature, males have been described as benefitting from marriage more than females, given females' investment in caring for the family, thereby placing males at higher risk following widowhood (Denney et al., 2009; Stack, 1998). However, the contrary appears to be true in the local context.

A tentative interpretation is that while women in the local context invest in caring for the family, they may also be dependent on men for various other needs. Another tentative account, deriving from studies in other countries, is that men are more likely to cohabitate after widowhood (Wu, Schimmele, & Ouellet, 2014). In the local context, Abela, Casha, Debono, and Lauri (2015) reported no significant gender differences in the attitudes towards remarriage in their sample, however their study examined remarriage following divorce and not widowhood. Therefore, further research would be necessary in order to gain a better understanding of this finding in the local context.

Gender and suicide method. Gender differences in the choice of suicide method are important, as they have been linked to the gender differences in suicide rates (Hee Ahn et al., 2012; WHO, 2014). This study's findings supported the hypothesis that males employ more lethal methods than females, except for drowning or submersion and jumping from a high

place, which were used by females more than males. Nonetheless, these gender differences are consistent with the literature, whereby females use self-poisoning (Callanan & Davis, 2012) and jumping more than males, and males use firearms more than females (Varnik et al., 2008).

Males' higher suicide lethality has been associated with high-risk methods used, method implementation, and accessibility (Cibis et al., 2012). In addition, it appears that gender differences in the social acceptability of suicide method may be present in the local context. These findings have important implications for suicide prevention strategies, which may be tailored to gender.

Gender and psychiatric services. Gender differences in suicide rates have also been partially attributed to differences in socially acceptable means of coping and help-seeking (WHO, 2014). The hypothesis that females would have more contact with psychiatric services than males, was supported in this study. However, while statistically significant, this had a small effect size. Nonetheless, in the local context, it is possible that social norms may have created an expectation for males to deal with their difficulties alone, which may discourage help-seeking behaviour and perhaps place them at higher risk of suicide. While further research is needed in this regard, this finding highlights the importance of tailoring services and interventions to males in the local context.

Age. The age patterns of suicide in the Maltese Islands are similar to those in high-income countries, with higher rates at middle age, rather than the higher rates at young and old age reported in low-income countries (WHO, 2013b). In this study, most individuals were from the age group 30 to 49, followed by the age group 50 to 69; and less individuals were aged 0 to 29 and over 70 years old, when compared to the local general population in 2017 (NSO, 2019).

With regards to the age group 0 to 29 years old, the low rates may be attributed to the fact that there were no suicides between the ages of 0 to 13. The absence of suicides under the age of 14 is consistent with international studies, given that suicide rates are lowest under the age of 15 and are rare in childhood or early adolescence (Pelkonen & Marttunen, 2003; WHO, 2013b). Moreover, the constructs of thwarted belongingness or a perception of alienation from others, and perceived burdensomeness in the interpersonal theory of suicide (Joiner, 2005; Van Orden et al., 2010), may shed light on suicide in middle and older age respectively.

The high local suicide rates in the age groups 30 to 49 and 50 to 69 may be understood in terms of increased responsibility and roles, reduced support, loss of family members, health decline, and work or financial pressures. Moreover, these individuals may find themselves in the "sandwich generation" (Schwartz as cited in Riley & Bowen, 2005, p. 52) of adults in their 40s or 50s caring for both their ageing parents and their adult children. In the local context, there may be a reluctance to place ageing parents in institutions; and adult children leave home at a relatively late age. Therefore, the burden of care may cause these adults to experience exponential physical, financial, and emotional stress (Steiner & Fletcher, 2017).

Furthermore, these findings may also be understood in terms of the process of individuation, which may be delayed in the local culture. According to Darmanin Kissaun (2016), aspects of the Maltese social context and dynamics may lead to difficulties with autonomy and the individuation process, and in turn lead to guilt, identity issues, and psychopathology. Therefore, while strong kin-centered networks may provide social support; pressures to put the family first and self-sacrifice may also lead to psychological distress (Martella, 2000). From a psychoanalytic understanding, suicide may be the manifestation of such issues with separation (Freud, 1917; Winnicott, 1971). These findings highlight the

importance of psychosocial support and treatment targeting these age groups in the local context.

***Age and suicide method*.** In this study, a statistically significant difference was only found with regards to individuals using self-poisoning by gases having a younger mean age. No significant differences were found in the other suicide methods described in the international literature; therefore, this research hypothesis was not supported (Koo et al., 2017). Further research may be useful in order to better understand the choice of suicide methods and to target prevention efforts.

Birth cohort. Cohort effects on suicide rates may be shaped by demographic structure, family changes, socioeconomic stressors, access to services, and levels of integration and regulation (Pampel & Williamson, 2001; Phillips, 2014; Snowdon et al., 2017; Stockard & O'Brien, 2002). While speculations may be made regarding the social situation between 1960 and 1979 in the Maltese Islands, these would be inconclusive. In addition, given the limited time period of this study, the higher incidence in this birth cohort may perhaps reflect the year of birth and year of suicide, rather than pure cohort effects.

Marital status. In this study, more individuals were single and separated, and less individuals were married and widowed, when compared to the local general population in 2011 (NSO, 2014). The findings regarding single, separated, and married statuses are consistent with the literature, whereby non-married people are at higher risk of suicide than married people (Kyung-Sook et al., 2018). This may be understood in terms of the theory of marital status integration (Gibbs, 2000) and societal integration theory (Durkheim as cited in Cutright et al., 2006), described in the Literature Review chapter, which suggest that marriage reduces role conflict and increases integration.

Furthermore, in the Maltese Islands, religion, family, and social values may provide a better understanding of the relationship between marital status and suicide. According to the European Values Survey of 2009, most Maltese people placed the family as a top priority in their lives (as cited in Abela, 2013). Despite a rapid change over time in family values, Abela (2014) maintained that marital satisfaction is high in the local context. Marital stability may be attributed to the availability and support of the extended family (Abela, 2013), which may shed further light on the protective nature of marriage against suicide.

Furthermore, local values may also shed light on single and separated marital statuses as potential risk factors for suicide. While the influence of the Catholic Church is decreasing (Abela, 2013), religious values are still prevalent (Abela et al., 2015; Galea, 2012; Lauri, Lauri, & Duriez, 2012). Moreover, underlying shame may still be strong (Darmanin Kissaun, 2017). Therefore, separation or divorce may have higher psychological costs for Roman Catholics, given the Church's sanctions and beliefs (Kim, 2011). Strong beliefs regarding commitment to marriage and its indissolubility may lead to heightened pressure and shame, and reduced support and understanding, for couples in distress or who separate (Abela, Frosh, & Dowling, 2005).

On the other hand, the finding regarding widowhood is not consistent with the international literature. However, sociocultural factors mediate the relationship between marital status and suicide (Bridge et al., 2006; Masocco et al., 2010; Yip et al., 2015). In the local context, a large proportion of newlyweds live in same town as their parents, and visit their parents and grandparents regularly (Tabone, 1995). Moreover, the old-age dependency ratio in the Maltese Islands is lower than the European average, indicating that the dependent population is well-supported (NSO, 2014). This support may therefore potentially mitigate the loss experienced following widowhood, when compared to less family-oriented communities.

Finally, it is important to note that in the study there were no data regarding divorce, given that this was not available in the data sources, as well as the recent legislation of divorce in 2011. The literature highlights the importance of differentiating separation from divorce when studying suicide (Wyder et al., 2009). Therefore, future research may address the difference between acute marital separation and long-term separation or divorce (Ide et al., 2010), which was not done in this study.

Residence. When comparing the residences of the individuals in the study to that of the general population in 2017, in the study more individuals were residents of the Southern Harbour and South Eastern regions; and less individuals were residents of the Northern Harbour, Western, Northern, and Gozo and Comino regions, with the largest discrepancy being in the Gozo and Comino region (NSO, 2019).

These findings do not appear to be consistent with international studies which have identified rural areas as having generally higher suicide rates (Álvaro-Meca et al., 2013; Fontanella et al., 2015; Helbich et al., 2017; Ji et al., 2001; Kapusta et al., 2008), attributed to reduced availability of health care services (Ji et al., 2001); rural socioeconomic decline; attitudes to help seeking; and access to means (Judd et al., 2006).

Instead, the local regional differences may be attributed to differences in socioeconomic status, education level, and social support, amongst other factors. These may increase the risk for suicide in terms of heightened stress; less resources to access services; as well as less awareness regarding mental health issues leading to more stigma and less help-seeking behaviour. According to local studies, the most common residence amongst offenders (Formosa, 2007), and individuals treated for substance abuse (Olivari D'Emanuele, Gellel, & Muscat, 2015), as well as a higher incidence of psychosis (Camilleri, Grech, & Taylor-East, 2012), have been identified in the Southern Harbour region.

Furthermore, the regions with the lowest average annual basic salary in 2017 were the Southern Harbour, Gozo and Comino, and South Eastern regions respectively; and the most unemployment was in the Southern Harbour region. In 2011, the Southern Harbour and South Eastern regions had the highest percentage of illiteracy (NSO, 2014). Gozo and Comino, Southern Harbour, and South Eastern regions also had the least percentage of students at the University of Malta (NSO, 2019).

Therefore, these socioeconomic factors may shed light on the suicide rates in the Southern Harbour and South Eastern regions, but not the low rates in Gozo and Comino. According to Xerri (2002), the areal differentiation between Gozo and Malta leads to variations in lifestyle, identity, and values. He referred to Gozo as a "community of affines", highlighting its smaller size and closer family bonds (Xerri, 2002, p. 21). Therefore, in Gozo, the lower suicide rates may perhaps be attributed to a smaller genetic pool; increased social support and tighter communities; religious beliefs; and other cultural protective factors.

Employment status. Some of the socioeconomic variables attributed to the regional differences in the above section, were investigated in this study, including employment status and occupation. When comparing the employment status of the individuals in the study to those of the local general population in 2011, it appears that in the study, more individuals were unemployed, pensioners, and boarded out or unable to work; and less individuals were employed, homemakers, and students (NSO, 2014).

Most of these findings are consistent with the literature, with employment and suicide rates being negatively correlated in most European countries (Reeves et al., 2015; Yur'yev et al., 2010). Job insecurity may place vulnerable populations at risk, or lead to mental health problems, thereby increasing suicide risk (Fountoulakis, 2017; Haw et al., 2015). Furthermore, employment issues may have important implications in the local context, as

according to the European Values Survey of 2009, most Maltese people placed work as the second highest priority in their lives (as cited in Abela, 2013). In the local context, a correlation between poverty and social exclusion has also been found, with health, education, employment, and family conflict as indicators (Abela & Tabone, 2008). Therefore, employment support may benefit individuals at risk of suicide.

However, unlike the literature (Schneider et al., 2011), in this study, being a homemaker was not a risk factor for suicide. This may perhaps reflect a culture where being a homemaker is socially and culturally supported. According to Abela, in the 1990s homemakers were significantly more happily married and experienced less stress than married women who were employed (as cited in Abela, 2013). Homemakers were responsible to care for their family, and valued raising their children (Baldacchino, 2003; O'Reilly Mizzi, 1994). Therefore, perhaps differently to other countries, in the local culture, being a homemaker is perceived positively and adds status to the family; and is therefore not a risk factor for suicide. It may be interesting to continue monitoring this variable as societal values change over time.

Occupation. Furthermore, occupational level may also be related to the impact of socioeconomic status and educational achievement discussed above. Social mobility may also be more difficult for individuals with a lower occupational status. When comparing all the occupations of the individuals in this study to those of the general population in 2011, it appears that in this study, individuals had occupations of lower skill and specialization levels (NSO, 2014).

Suicide-related Variables

This section will delve into a discussion of the multiple suicide-related variables in this study. These include temporal factors, locations of suicide and hotspots, suicide methods,

intoxication at the time of death, as well as the communication of suicidal ideation and suicide notes.

Year of suicide. There was a statistically significant increase in suicides over the time period in this study. This is consistent with the DHIR (2013; 2015)'s report that while reported suicide rates in the Maltese Islands are lower than other European countries, they have significantly increased over the past decades, as opposed to the overall European and international decline between 2000 and 2012 (Helema et al., 2014; WHO, 2013b).

The following considerations must be kept in mind when interpreting this rising trend: in the earlier years of the study different databases were used than at present; there appears to have been less accurate reporting and classification in the past; and the magisterial ordering of autopsies may possibly have been less rigorous in earlier years. In addition to these limitations, social and cultural changes may also underpin these suicide trends, as the Maltese Islands can no longer be considered solely traditional (Abela, 2013), and are moving towards a more individualistic society (Hofstede, Hofstede, & Minkov, 2010).

Furthermore, while statistically the trend is still increasing, it may be observed that there has been a decrease in suicides in the past three years. However, one would need to examine the trend in the coming years in order to determine the statistical significance of this observation, and to be able to make appropriate interpretations.

***Year of suicide and gender*.** The gender differences described in the respective section above, including cultural traits of individualism and masculinity, the choice of more lethal suicide methods, and reduced help-seeking behaviour amongst males, appear to have persisted over time. The statistically significant increase in male suicides is consistent with the research hypothesis, and international trends (WHO, 2014). This finding is also consistent

with the increased rate of male suicide which was noted between 1970 and 1995 in the Maltese Islands (WHO, 1999).

***Year of suicide and age*.** Differently to the literature (Snowdon et al., 2017), the hypothesis regarding a decrease in old age was not supported in this study. However, the statistically significant increase in suicides over time for the age groups 30 to 49 and 50 to 69 may be understood in terms of the discussion in the respective section on age. Increased life expectancy in recent decades has meant an increase in ageing parents requiring care; and adult children's delayed marriage and employment have meant that they are staying at home longer (Riley & Bowen, 2005). Therefore, the burden of care in these age groups may have increased in recent years.

***Year of suicide and suicide method*.** The increase in hanging over time in this study is important, given that the lethality of the method employed is a risk factor for suicide (Lim et al., 2014), and an increase in rates has been associated with an increase in hanging in some countries (Park et al., 2014). Therefore, at present, local suicide prevention measures may need to target the access to means and acceptability of hanging.

On the other hand, the hypothesis regarding a decrease in the use of firearms over time was not supported in the local context, unlike the international scenario (Elnour & Harrison, 2008; Thomas et al., 2013). While there has been an overall increase in firearm license holders between 1995 and 2018 in the Maltese Islands, the regulations regarding security restrictions have remained constant (S. Petroni, personal communication, May 28, 2019). Therefore, the consistency in regulations may perhaps underlie the constant suicide trend over time with regards to firearms.

Month and season. The high suicides rates in May or Spring in this study are consistent with the international literature, however the low rates in October or Autumn differ

from other countries which normally experience a second peak at that time (Christodoulou et al., 2012; Holopainen et al., 2013). However, variations have been recorded across time and countries (Casey et al., 2012; Woo et al., 2012), therefore the local rates may be attributed to region-specific bioclimatic, sociodemographic, and biological factors (Holopainen et al., 2013).

Time of suicide. Few studies have measured suicide patterns in the time of day. Some have identified a peak in the mornings, however variations according to multiple other factors have been found, including subpopulation, geography and climate, as well as economic and social conditions (Boo, Matsubayashi, & Ueda, 2019; Galvão, Silva, & da Silva, 2018; Maldonado & Kraus, 1991). In this study, most suicides took place in the time period between 16:00 and 19:59. Given the limited availability of these data, caution needs to be taken when interpreting this finding.

Location of suicide. As with other countries, most suicides in this study occurred at the individuals' home, followed by outdoor or other settings. However, it appears that there were less suicides in hospital settings when compared to international studies (Kposowa & McElvain, 2006; Rhee et al., 2016). This difference may perhaps be attributed to the removal of *general hospital* locations between 1995 and 2001 in this study, given the lack of clarity between location of suicide and location of death in the sources of data. Moreover, another consideration may be the breadth of the *other* category for this variable. Nonetheless, the findings regarding the location of suicide have important implications for suicide prevention measures.

Locality and suicide hotspots. The localities of suicide identified in this study appear to reflect both the individuals' residence, given the high proportion of suicides at home; as well as the suicide hotspots. Dingli Cliffs, Mosta Bridge, and Lascaris Ditch in Valletta were

the three most common suicide hotpots. However, it is possible that there may have been other hotspots which were less known in the data sources and therefore not identified as such. The identification of hotspots is important for suicide prevention efforts, in order to be able to implement measures such as safety fences (Cox et al., 2013; Florentine & Crane, 2010; Zalsman et al., 2017).

Suicide method. Additionally, an accurate understanding of the local preferences in suicide methods is important in order to implement effective prevention strategies by restricting access to means (WHO, 2014). Hanging, strangulation, or suffocation was the most commonly used suicide method in this study, which is consistent with the evidence for high-income countries (WHO, 2013b). The choice of method may reflect both availability and socio-cultural acceptability (Kolves et al., 2018). However, when interpreting this finding, it is important to consider that while hanging may be more readily identified and classified as suicide, there may have been possible misclassifications of suicides in cases of uncommon or unidentifiable suicide methods. Moreover, in cases where two simultaneous suicide methods were used, the primary cause of death listed on the death certificate was used.

Toxicology post-mortem exam. The literature has highlighted a relationship between alcohol intoxication and suicide (Cherpitel et al., 2004), with the presence of an existing alcohol problem being the strongest risk factor for intoxication before suicide (Caetano et al., 2015). The toxicology reports reviewed in this study indicated blood levels of medication, illicit drugs, and alcohol for some individuals. However, these findings may have been largely impacted by the fact that locally, toxicology post-mortem exams are not carried out for all individuals who die by suicide. One possible interpretation may be that during the investigations, the presence of medication and illicit drugs were found more than alcohol because self-poisoning by the former two substances may be more likely to warrant a

toxicology exam, while using another suicide method while being under the influence of alcohol may be less likely to warrant a toxicology exam.

Communication of suicidal ideation and suicide note. Communication of suicidal ideation or a suicide plan, and suicide notes, were identified in this study. While these findings indicate that individuals sometimes communicated suicidal ideation or plans, and left suicide notes, the sources of information for these variables were not comprehensive enough to make further conclusions. Instead, these findings highlight the need for better record-keeping and further research using other designs.

Psychiatric Variables

The findings regarding the multiple psychiatric variables will be discussed in this section. Some of these findings are compared to general psychiatric inpatient population statistics in order to make more appropriate interpretations. A limitation of the findings in this section is that no data regarding private psychiatric services nor GP services were included in this study.

Mental illness. Mental illness has been highly associated with suicide (Crump et al., 2014; Orsolini et al., 2016). The percentage of mental illness diagnoses identified in this study, 33%, is smaller than that quoted in international studies, averaging at 62.1% (Bachmann, 2018; Ferrari et al., 2014). However, in this study, diagnoses were obtained from MCH and MDH records, therefore diagnoses not listed in these sources of data would not have been included. Moreover, another consideration is the presence of undiagnosed mental illness, which may perhaps place individuals at higher suicide risk due to lack of treatment and support.

In the Maltese Islands, the small size, dense population, and architectural layout have created a “face-to-face community where everybody knows everybody else” (Abela, 2013, p.

748), and gossip may be a means of social control (O'Reilly Mizzi, 1994). Given this high social visibility, inhabitants tend to be highly impacted by public opinion, attitudes, and behaviour (Sultana & Baldacchino, 1994). This high sense of exposure (Clark, 2012) may also foster social comparison and competition, with a negative impact on one's self-esteem. Furthermore, while stigma surrounding mental illness has decreased, it is still present (Agius, Falzon Aquilina, Pace, & Grech, 2016). Therefore, having a mental illness may lead to shame and distress in this context.

Moreover, the cognitive and information processing accounts of suicide, including hopelessness and pessimistic views of the future (Beck, 1963), perfectionism (Beevers & Miller, 2004), and unbearability (Wenzel & Beck, 2008), may be present in individuals with mental illness. This may place them at higher risk of suicide, particularly in this societal context of shame and stigma.

***Mental illness diagnosis*.** The most common category of mental illness in this study was *undiagnosed depression*, which may be attributed to the lack of requirement for an official diagnosis, thereby being more frequently reported.

Local epidemiological data on mental illness are lacking (Grech, 2016; Ministry for Health, 2018). The individuals in the study were compared to the general psychiatric inpatient population for whom an ICD-10 diagnosis was available in the 2017 annual reports (Mental Health Malta, 2017). It appears that in this study, more individuals than the inpatient population were diagnosed with schizophrenia, mood disorder, and personality disorders; while less individuals were diagnosed with psychoactive substance use, and neurotic disorders or anxiety.

Studies have shown that mood disorders and psychoactive substance use disorders are the most prevalent diagnoses amongst individuals who die by suicide (Gonda et al., 2012;

Hawton et al., 2013; Henriksson et al., 1993; Overholser et al., 2012). Therefore, the findings from this study are consistent with regards to mood disorders, but not substance use disorders. One consideration regarding substance use disorders in this study is that given the issue with determining intent in illicit drug overdoses, data regarding individuals with substance use disorders may have been excluded. Moreover, another possible contribution may be the various local services available for the treatment of substance use disorders.

Psychiatric medication. The findings regarding the prescription of psychiatric medication support the findings regarding diagnoses, with antidepressants being the most common. Once again, prescriptions were obtained from MCH and MDH records, therefore a limitation is that medication not listed in these sources of data would not have been included in the study. Nonetheless, a possible implication of this finding, together with the finding regarding depressive disorders in this study, is the importance of appropriate psychiatric treatment, particularly for depression, in suicide prevention efforts.

Contact with psychiatric services. More than half of the individuals in the study had had contact with psychiatric services, which is higher than the proportion in the local general population (Mental Health Malta, 2018), and similar to the evidence from other countries (Luoma et al., 2002). Nevertheless, international variations have been attributed to cross-cultural and regional differences in the perception of mental illness, suicide, and help-seeking behaviour (Dervic et al., 2006; Reynders et al., 2014; 2016).

A Pan European study found high levels of internalized self-stigma of mental illness in the Maltese Islands (Krajewski, Burazeri, & Brand, 2013). In addition to the high social visibility, stigma, and shame described above, the country's size and density mean that people inevitably have multiple roles or relationships in different circumstances (Abela &

Sammut Scerri, 2010; Sultana & Baldacchino, 1994). This may instigate individuals to guard their personal lives more carefully, and perhaps deter them from accessing services.

Type of service and admission to psychiatric ward. It appears that the individuals in the study made more use of MCH and PU, and less use of mental health clinics and POP, when compared to the general inpatient and outpatient populations using psychiatric services in 2018 (Mental Health Malta, 2018). The higher use of inpatient services may perhaps reflect the higher intensity of treatment needed by the population in the study. Nonetheless, a large proportion of the individuals in the study made use of multiple psychiatric services, which may have included the use of outpatient services. Furthermore, while the main psychiatric services were included in the study, other services such as drug rehabilitation, correctional services, and social services, were not included. Therefore, it may be useful for future research to investigate the use of these additional service in relation to suicide.

Time since last contact with psychiatric services. Similarly to international studies (Health Quality Improvement Partnership, 2018; NICE, 2016a), this study identified the first week since the last contact with mental health services as a period of heightened suicide risk. Insufficient treatment, reduced monitoring upon discharge, and increased access to means, may underlie this heightened suicide risk. This finding has important implications for suicide prevention efforts, as it is recommended that additional support and monitoring should be provided upon discharge from inpatient mental health services, and during transitions in this timeframe (Chung et al., 2017).

History of suicide attempts. The history of suicide attempts identified from the sources of data in this study have significant limitations and are not likely to be an accurate representation of reality. Data were only available when suicide attempts were the reason for contact with psychiatric services, or when the patient or family disclosed a history of suicide

attempts to professionals in the services from which these data were obtained, such as the psychiatric services and the mortuary.

Further research is therefore needed to explore the link between suicide attempts and suicide. According to the interpersonal theory of suicide, acquired capability by injurious experiences erodes the self-preservation instinct and increases suicide risk (Joiner, 2005; Van Orden et al., 2010). Moreover, the evidence has shown that a prior suicide attempt is one of the strongest risk factors for suicide throughout the person's lifetime (Bostwick et al., 2016; Goñi-Sarriés et al., 2018; Suominen et al., 2004).

Number and method of previous suicide attempts. Amongst the individuals with a known history of suicide attempts in the study, most had had three previous attempts. In addition, an increase in violence or lethality may be noted when comparing the method used in previous suicide attempts to the suicide method. This is consistent with the literature (Paraschakis et al., 2014). However, when interpreting this finding it is important to keep in mind that this dataset was incomplete, and that data may have possibly been skewed in terms of which methods of previous suicide attempts were recorded.

Substance abuse. Various studies have highlighted the association between suicide and alcohol or illicit drug abuse (Wilcox et al., 2004). Nonetheless, a lack of uniform classification of different types of substance use has made comparison across studies difficult (Icick et al., 2017). Substance abuse was identified amongst some individuals in this study, however, the sources of data for this variable were not comprehensive enough to make further conclusions regarding this variable. A more comprehensive understanding would require access to the databases of substance abuse services, amongst other sources.

Adverse Life Events and Other Variables

The findings regarding adverse life events and other variables will be discussed in this section. Data for these variables were highly lacking in the sources of data used for this study, and therefore do not appear to be an accurate representation of reality. Instead, they may be more usefully discussed in terms of identifying what data are available locally, in order to make recommendations for surveillance strategies and future research.

Data regarding contact with primary care, legal problems, financial difficulties, and loss of other, were limited. Data were also lacking for history of abuse and family history, which may perhaps also be partially attributed to these variables often not being known or disclosed. In the local context, stigma (Agius et al., 2016) and high social visibility or exposure (Clark, 2012; Sultana & Baldacchino, 1994) may foster such a lack of disclosure. Furthermore, the findings regarding relationship problems and physical conditions were skewed by the limited sources of data collection used.

Therefore, while studies have highlighted these variables as risk factors for suicide, more comprehensive data would need to be obtained from other records in order to be able to identify these variables as risk factors in the Maltese Islands. Furthermore, research indicates that while negative life events or stressors are important (Overholser et al., 2012), it is the personal impact and perception of the event, rather than the event itself, which increases suicide risk (Moscicki, 2014). Therefore, in the next chapter, alternative research designs will be recommended for the examination of factors which contribute to how individuals cope with adverse life events, potentially mediating the relationship with suicide.

Conclusion

In this chapter, the study's findings have been discussed in the light of the extant literature. In order to be able to make more appropriate interpretations, the findings were

compared to general population statistics. Moreover, the findings were discussed in terms of the local context and culture, in order to provide an understanding of suicide specific to the Maltese Islands. In the next chapter, this study will be concluded by exploring its limitations as well as providing recommendations for research, policy, and practice.

Conclusion

Introduction

This study investigated the prevalence and the characteristics of the individuals who died by suicide in the Maltese Islands between 1995 and 2018. Data were collected from Felice et al. (2014)'s study, post-mortem records, the National Mortality Register, and medical records. A quantitative methodology was used to carry out secondary data analysis. In this concluding chapter, a summary of the findings yielded by this investigation will be provided. This will be followed by a consideration of some of the limitations of the study. Finally, recommendations for research, as well as implications for policy and practice will be outlined.

Summary of the Main Findings

The findings included the overall prevalence of suicide, as well as multiple demographic, suicide-related, psychiatric, adverse life events and other variables. In this study, the total number of suicides was 635 individuals.

When compared to the general population, in this study there was a higher proportion of males; individuals between the ages of 30 and 49; and individuals with a marital status of single or separated. There was also a higher proportion of individuals from the Southern Harbour region; an employment status of being unemployed, pensioners, or boarded out; as well as a lower occupational status. The findings from bivariate analyses were also presented, namely those for gender, age, and year of suicide.

An increasing suicide trend was found over the years between 1995 and 2018. In addition, the most common season and month of suicide were Spring and May respectively. Most suicides were at the individual's home, and the most common suicide method was hanging, strangulation, or suffocation. Several suicide hotspots were also identified.

Various psychiatric variables were investigated, however these had significant limitations due to missing data. A third of the individuals in the study had been diagnosed with a mental illness by the psychiatric services at MCH or MDH. Furthermore, more than half of the individuals in the study had had contact with these psychiatric services at some point in their lives. Several adverse life events and other variables were also identified; however, these data were significantly lacking in the sources used in this study.

Limitations of the Study

The retrospective nature of this study and the use of secondary data may carry several limitations (Blaikie, 2007). Different instruments and categorization used, as well as definitional variations across the sources of data, may have created inconsistencies. Moreover, the presence of missing data, the possibility of incomplete information, and sources' biases, may have skewed the findings. Therefore, the accuracy of this study is partially dependent on the accuracy of Felice et al. (2014)'s study, the databases, and other records used as sources of data. While some epidemiological studies of suicide have employed a prospective design, this would be limited to subpopulations or specific settings, such as prospective suicide in an inpatient setting (Sani et al., 2011). Therefore, the retrospective design was appropriate for this study's research questions. However, its limitations must still be considered when interpreting the findings.

Limitations of the sources of data used in this study include the following. Firstly, changes in database systems and in the staff responsible for the mortuary post-mortem records and the National Mortality Register over the years, may have resulted in discrepancies and missing data. There appears to have been less accurate reporting and classification in the past. Moreover, different record-keeping, both within and across services, such as the medical records, may also have created inconsistencies.

Difficulties with determining the cause of death may have resulted in some cases remaining unascertained or pending, such as when the evidence was inconclusive. Cases may also have been missed, such as when bodies were not found. Furthermore, the classification of illicit drug overdoses is particularly problematic in the local context, due to issues in determining intent, as well as discrepancies amongst different entities or professionals. These misclassification errors, amongst others, may have led to inaccuracies and potentially unidentified cases of suicide. In addition to misclassification, under-reporting of both the prevalence of suicide and of the variables investigated in this study, may have limited the findings.

Moreover, limitations of the study's data collection process include the following. In this study, discrepant cases were identified across the different sources of data. The way in which these discrepant cases were handled was explained in the Method chapter, and may have included errors, despite efforts to ensure accuracy. Furthermore, data were not always available or collected for all the cases, such as when medical record files were not found at the hospitals, or when toxicology reports were pending, particularly for the year 2018. Therefore, these data remained missing in the study.

Furthermore, there are other potential sources of data collection which were not accessed in this study. These include records from private practice, general hospital non-psychiatric medical files, police investigations, and other services. This limitation is particularly relevant to the data for the adverse life events and other variables, a large proportion of which were missing in this study.

Recommendations for Future Research

Research on suicide is highly lacking in the Maltese Islands. Being the first study of its kind, together with Felice et al. (2014)'s study, this study may provide directions for future

research in the local context. A preliminary recommendation for all suicide research is the up-to-date application of uniform criteria and terminology surrounding suicide (Krug et al., 2002).

Firstly, future research on suicide may access other sources of data, such as police records, correctional facilities, substance abuse services, and social services, as described in the respective section on this study's limitations above. Such sources of data collection may clarify the incomplete findings from this study and provide more comprehensive evidence regarding variables for which data were most lacking, namely substance abuse, adverse life events and other variables. Furthermore, in the future, it may also be useful to re-examine the suicide trends over time, in order to examine whether the observed decrease in suicides in the past three years continues and whether it becomes significant.

In addition to identifying individual risk factors, future research may also address the complex ways in which risk factors interact with each other to determine vulnerability (BPS, 2017). Moreover, research on protective factors is limited when compared to research on risk factors for suicide (Bertolote, 2014). Therefore, this is another area of suicide research which may require attention in the local context, given that it was not addressed by this study.

A psychological autopsy may also be recommended as a design for future research. This would reconstruct the psychosocial environment surrounding suicide, and thus provide a more detailed understanding of the circumstances (Batt, Bellivier, Delatte, & Spreux-Varoquaux, 2006). Such a design would be useful in order to address variables such as history of self-directed violence, adverse events, social interaction, and other elements in the individual's life which may not be accessible through databases or records (Cavanagh et al., 2003). Moreover, the BPS (2017) recommended the incorporation of psychological factors

into national databases and studies. While this could not be addressed by this study's design, it is an important recommendation for future local research.

Additionally, the personal impact and perception of experiences may increase suicide risk more than the event itself (Moscicki, 2014). Such a study design would therefore enable the investigation of individual factors and means of coping with adverse life events, which may predispose individuals to suicide. Therefore, another research question, which could not be addressed by this study, but that emerged from the data, may be to investigate how psychological variables mediate the relationship between risk factors and suicide.

Implications for Policy and Practice

The upward suicide trend over the study's 24-year period warrants heightened attention. This study provides a better understanding of suicide in the local context, which may benefit policymakers, clinicians and other professionals, as well as the general public. Moreover, the findings from this study give rise to various implications and recommendations across various levels of policy and practice.

Firstly, more accurate and consistent classification and recording of suicide, according to intent, would be in order (Crosby et al., 2011; Krug et al., 2002). Secondly, national data collection is recommended by setting up regular surveillance and a suicide database (U.S. Department of Health and Human Services, 2012). This is essential in order to, subsequently, be able to implement a national strategy or action plan for suicide prevention (WHO, 2014).

This recommendation is in line with the Mental Health Strategy for Malta 2020-2030 (Ministry for Health, 2018) and the European mental health action plan 2013-2020 (WHO, 2015), both of which proposed the development and implementation of suicide prevention strategies that incorporate best evidence. Furthermore, evidence-based policies and programs

aimed at reducing suicide require collaboration between researchers and policymakers (Meichenbaum, 2005; Sareen et al., 2014).

Given the complex and multifactorial nature of suicide, evidence-based suicide prevention requires interventions at multiple levels (Hawton & Pirkis, 2017; Zalsman et al., 2017). At a population level, the following recommendations for universal interventions emerged from this study. An important intervention is reducing stigma surrounding suicide and mental health in the local context. Increasing and improving the provision of mental health care is another important recommendation. Given that almost half of the individuals in the study had never had contact with psychiatric services, psychoeducation may also be important in order to help significant others to recognize signs and refer individuals to the appropriate services.

Additionally, another suicide prevention strategy is reducing access to lethal means, such as setting up safety fences at the suicide hotspots identified in this study (Florentine & Crane, 2010). This would be important in the local context given that jumping was the second most commonly used suicide method. However, means restriction is difficult to do with hanging, which was the most commonly used suicide method in the local context. Therefore, a focus on early intervention may perhaps be more effective given the frequency of this suicide method.

At a sub-group level, selective interventions are recommended. This study has identified variables with higher incidence amongst this population. Therefore, interventions may target males, individuals in the 30 to 49 age group, and individuals at risk of unemployment. Moreover, easily accessible psychological and psychiatric services must be adapted for individuals with a low socioeconomic status, particularly residing in the Southern Harbour region. Individuals with mental health problems, particularly depression, and

individuals with a history of suicide attempts, require special attention. Furthermore, given this study's findings, it is critical to carefully assess suicide risk prior to discharge from psychiatric services, and to support such transitions, especially in the first week following discharge.

At an individual level, indicated interventions for individuals at immediate risk must be provided. The current local services available (S. Sammut Alessi, personal communication, May 21, 2019) must therefore be equipped to deal with such crises effectively. This may be done by using research on risk and protective factors in order to inform comprehensive assessments, case conceptualizations, and interventions (Meichenbaum, 2005; Sareen et al., 2014). Finally, at all levels, it is important for professionals to be specifically trained in working with suicidal behavior (National Collaborating Centre for Mental Health, 2018; Ward-Ciesielski & Linehan, 2014).

Conclusion

In conclusion, this study has started addressing the research gap in the Maltese Islands by providing a culturally specific understanding of suicide. It has provided an evaluation of the limitations of the data available in the local context and made recommendations to improve its collection, with the hope of informing future research and policy in creating much-needed suicide surveillance protocols. The upward suicide trend over the study's 24-year period underscores the importance of collaboration between researchers, policymakers, and clinicians. This study has identified at-risk groups and the most commonly used suicide methods, which provide key considerations for suicide prevention efforts. Moreover, it has illustrated the complexity of suicide and the multiple levels of intervention needed to address this public health priority.

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Appendix A

Data Collection Template

Case # _____
Name _____
ID _____

Nationality	Maltese	Other			
Residence					
Date of suicide	Day	Month	Year		**Time**
Location of suicide	Home	Institution	Hospital	Other	
Locality of suicide				**Hotspot**	
Suicide method	Hanging	Jumping	Self-poisoning	Firearm	Other
Gender	Male	Female	Other		
Age		**D.O.B.**			
Marital status	Single	Married	Widowed	Separated	
Mental illness		**Diagnosis**		**RX**	
Contact with psychiatric services	Date	Reason	Service		
Contact with primary care providers	Date	Reason	Service		
Admission to psychiatric ward	Date	Reason			
History of previous suicide attempt/s	Date	Method			
Suicide note					
Ideation/plan					
Physical illness		**Type**			
Other	Undiagnosed Depression	Substance abuse – drugs	Substance abuse – alcohol		
Loss	Parent	Child	Partner	Other	
Abuse	Bullying	Sexual assault	Domestic v.		
Family history		Mental illness		Suicide	
Employment	Employed	Unemployed	Pensioner	Homemaker	Student
Occupation					
Legal problems					
Financial issues					
Relationship problems	Marital problems	Marital breakup	Relationship problems	Relationship breakup	
Toxicology report		**Intoxication**		**RX**	

Appendix B

Sample Death Certificate

CERTIFICATE OF DEATH AND CAUSE THEREOF

1. ***Name and Surname*** ..... 2.***Identity No***.....

3. ***Sex***: male ☐ female ☐ unascertained ☐ 4.***Age***..... 5.***Date of birth***.....

6. ***Infant & fetal deaths***: birth weight (g):..... Gestation (weeks)..... Time of birth.....

7. ***Place of birth***..... 8. ***Nationality***.....

9. ***Permanent Residence***.....

10. ***Employment status***: employed ☐ unemployed ☐ pensioner ☐ housekeeper ☐ student ☐ unable to work ☐

11. ***Occupation*** (*if retired please write previous occupation*).....

12. ***Name and Surname of Parents & whether living or dead***.....

13a.***Marital Status:*** bachelor/spinster ☐ married ☐ widowed ☐ other ☐ (specify): .....

13b.***Where applicable the name & surname of spouse***.....

14. ***Hour, day, month and year of death***.....

15. ***Place where death occurred***.....

16. **Cause of death** — *Approximate interval between onset & death*

I *Disease or condition directly leading to death**
- a. ..... due to (or as a consequence of)

Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last
- b. ..... due to (or as a consequence of)
- c. ..... due to (or as a consequence of)
- d. .....

II: *Other significant conditions contributing to death but not related to the disease or condition causing it:*

* This does not mean mode of dying e.g. respiratory failure. It means the disease, injury or complication that caused death.

17. Deaths due to accidents or injuries:

Date of Injury:	Place of injury:	How injury occurred:	Injury at work: Yes ☐ No ☐

18. If female indicate if:
death occurred during pregnancy: ☐ death occurred within 42 days after pregnancy: ☐ death occurred between 42 days & 1 year after pregnancy: ☐

19. ***Place of Burial***..... ***Burial Permit no***.....

20.***Name, Surname & Medical Council number of Medical Practitioner***.....

21. ***Address*** .....

22. ***Signature of Medical Practitioner***..... 23. ***Date***.....

HEALTH DIVISION DH 35

Appendix C

Discrepant Cases

Table C1 provides an overview of the information obtained from the medical files, which indicated the possibility of suicidal intent in these seven cases between 2014 and 2018. Identifiable details were removed. Other information, such as discharge against medical advice or other adverse events, were noted but are not displayed here in order to ensure that individuals are not identifiable.

Table C1

Description of discrepant cases

Case	Cause of death	Communication of suicidal ideation	History of attempts	Diagnosis	Psychiatric services
1	Self-poisoning: illicit drugs	Yes	Self-poisoning	Schizophrenia	Multiple
2	Self-poisoning: illicit drugs	Yes	Self-poisoning	Depression	Multiple
3	Self-poisoning: illicit drugs	Yes	Yes	Depression	MCH
4	Self-poisoning	Yes	-	Schizophrenia	Multiple
5	Self-poisoning	Yes	-	Depression	MCH
6	Self-poisoning: illicit drugs	-	Self-poisoning	Substance use	Multiple
7	Pending	Yes	Yes	Schizophrenia	Multiple

Note. The dash symbol represents unavailable information.

Appendix D

Variable Codes

A list of all the variables and respective codes inputted into SPSS are presented in Table D2. Additional information regarding the variables and codes is also provided. It may be noted that the category *no* is listed in this table. However, as described in the Results chapter, *no* was inputted into SPSS as missing data, coded *999*, for most of the variables when data were not available, such as for adverse life events.

Table D2

Variable codes

Variable	**Codes**	**Information**
Case number	Number	
Nationality	1 Maltese 2 Gozitan 3 Other	See Appendix K for regrouping.
Residence	1 Southern harbour 2 Northern harbour 3 South Eastern 4 Western 5 Northern 6 Gozo and Comino 7 Not a resident	
Date	Date	
Year of suicide	Year	
Month of suicide	1 January 2 February 3 March 4 April 5 May 6 June 7 July 8 August 9 September 10 October 11 November 12 December	
Season	1 Winter 2 Spring 3 Summer	

	4 Autumn	
Time	Number	Time by hour of day. Also categorized into the following groups: 24:00-3:59 04:00-7.59 08:00-11.59 12:00-15:59 16:00-19:59 20:00-23:59
Location	1 home 2 residential institution 3 general hospital 4 outside or not home 5 at sea 6 correctional facility 7 psychiatric hospital	Residential address including garage.
Locality of suicide	1 Southern harbour 2 Northern harbour 3 South Eastern 4 Western 5 Northern 6 Gozo and Comino	
Hotspots	1 Dingli cliffs 2 Valletta St James' ditch 3 Mosta bridge 4 Mellieha Tal-Ahrax 5 Valletta: Lascaris' ditch 6 Valletta: Upper Barrakka	
Suicide method	 1 self-poisoning: medication 2 self-poisoning: illicit drugs 3 self-poisoning: alcohol 4 self-poisoning: gases 5 self-poisoning: chemicals 6 hanging, strangulation, or suffocation 7 drowning or submersion 8 firearm 9 sharp object 10 jumping from a high place 11 jumping before moving object 12 other 13 self-poisoning: pesticides	ICD-10 mortality codes: X60, X61 X62 X65 X67 X69 X70 X71 X72, X73, X74 X78 X80 X81 X83, X84 X68 See Appendix K for regrouping.
Gender	1 male	

	2 female	
Date of birth	Date	
Year of birth	Year	
Birth cohort	1900-1909 1910-1919 1920-1929 1930-1939 1940-1949 1950-1959 1960-1969 1970-1979 1980-1989 1990-1999 2000-2009	Classified by ten-year periods from 1900 to 2009.
Age	Number	
Marital status	1 single 2 married 3 widowed 4 separated	
Employment	1 employed 2 unemployed 3 pensioner 4 boarded out or unable to work 5 homemaker 6 student	 “Housewife” in the records
Occupation	0 armed forces 1 legislators, senior officials, managers 2 professionals 3 technicians, associate professionals 4 clerks 5 service and sales workers 6 agricultural and fishery workers 7 craft and trades 8 plant and machine operators 9 elementary occupations	
Mental illness	1 yes 2 no	
Mental illness: type	 1 mood disorders: depressive 2 schizophrenia, schizotypal, delusional disorders 3 mood disorders: bipolar 4 neurotic disorders: anxiety 5 personality disorders 6 psychoactive substance use 7 dementias 8 undiagnosed depression	ICD-10 disorders codes: F32-39 F20-29 F30-31 F40-48 F60-69 F10-19 F00-03
Psychiatric medication	1 yes	

	2 no	
Psychiatric medication: type	1 stimulants 2 antidepressants 3 antipsychotics 4 mood stabilisers 5 antianxiety	
Psychiatric services	1 yes 2 no	
Psychiatric services: type	1 MCH 2 PU 3 POP 4 Psych HC 5 Psych AE 6 Multiple 7 Gozo	 Psychiatric health centers. A&E crises or psychiatric. Psychiatric services.
Psychiatric services: time since last contact	1 At time of suicide 2 1 week or less 3 1 month or less 4 3 months or less 5 6 months or less 6 1 year or less 7 More than 1 year	For AE, HC, and POP this refers to the date of the last appointment. For MCH and PU this refers to the date of discharge or last contact before being sent on leave.
Psychiatric admissions	1 yes 2 no	PU, MCH, or Gozo.
Attempts	1 yes 2 no	
Attempts: number	Number	
Attempts: method	1 self-poisoning: medication 2 self-poisoning: illicit 3 self-poisoning: alcohol 4 self-poisoning: gases 5 self-poisoning: chemicals 6 hanging, strangulation, or suffocation 7 drowning or submersion 8 firearm 9 sharp object 10 jumping from a high place 11 jumping before moving object 12 other 13 self-poisoning: pesticides 14 multiple methods	
Expressed ideation or plan	1 yes 2 no	Includes having expressed a wish to die, suicidal intent, or a suicide plan.
Suicide note	1 yes 2 no	Includes hand-written notes, voice calls, text messages, and photographs.

Medical services	1 yes 2 no	Data from CPAS (A&E or ITU at MDH) and mortuary documents.
Physical condition	1 yes 2 no	
Physical condition: type	1 cancer 2 circulatory system 3 Huntington 4 other 5 pain 6 stroke 7 injury 8 seizures 9 diabetes	Accident, injury, mobility.
Substance abuse	1 illicit drugs 2 alcohol 3 no	Does not include ICD-10 diagnosis of psychoactive substance use disorder.
Relational	1 marital problems 2 marital breakup 3 relationship problems 4 relationship breakup	
Loss of other	1 partner 2 child 3 parent 4 other	
Family history	1 yes 2 no	Of mental illness or suicide.
Abuse	1 sexual abuse 2 domestic violence 3 bullying 4 other	
Legal	1 present incarceration 2 past incarceration 3 other legal issues 4 no	E.g. pending court cases.
Financial	1 yes 2 no	
Toxicology	1 alcohol 2 illicit drugs 3 medication	

Appendix E

Geographical Regions

The Nomenclature of Territorial Units for Statistics (NUTS) divides MALTA into two regions:

1. Malta
2. Gozo and Comino.

The Local Administrative Units (LAU) 1 divide MALTA into six districts and LAU 2 into 68 localities. These were used for the classification of residence and locality in the study, and are presented in Table E3.

Table E3

LAU districts and localities

LAU 1	LAU 2
Southern Harbour	Cospicua; Fgura; Floriana; Ħal Luqa; Ħaż-Żabbar; Kalkara; Marsa; Paola; Santa Luċija; Senglea; Ħal Tarxien; Valletta; Vittoriosa; Xgħajra.
Northern Harbour	Birkirkara; Gżira; Ħal Qormi; Ħamrun; Msida; Pembroke; San Ġwann; Santa Venera; St Julian's; Swieqi; Ta’ Xbiex; Tal-Pietà; Tas-Sliema.
South Eastern	Birżebbuġa; Gudja; Ħal Għaxaq; Ħal Kirkop; Ħal Safi; Marsaskala; Marsaxlokk; Mqabba; Qrendi; Żejtun; Żurrieq.
Western	Ħad-Dingli; Ħal Balzan; Ħal Lija; Ħ'Attard; Ħaż-Żebbuġ; Iklin; Mdina; Mtarfa; Rabat; Siġġiewi.
Northern	Ħal Għargħur; Mellieħa; Mġarr; Mosta; Naxxar; St Paul's Bay.
Gozo and Comino	Fontana; Għajnsielem; Għarb; Għasri; Munxar; Nadur; Qala; San Lawrenz; Ta' Kerċem; Ta' Sannat; Victoria; Xagħra; Xewkija; Żebbuġ.

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Appendix F

ISCO-88 Occupational Classification

The following briefly outlines ISCO-88 major groups, and is meant to facilitate the interpretation of the classification.

1. Legislators, senior officials and managers

This major group includes occupations whose main tasks consist of determining and formulating government policies, as well as laws and public regulations, overseeing their implementation, representing governments and acting on their behalf, or planning, directing and coordinating the policies and activities of enterprises and organisations, or departments. Reference to skill level has not been made in defining the scope of this major group, which has been divided into three sub-major groups, eight minor groups and 33 unit groups, reflecting differences in tasks associated with different areas of authority and different types of enterprises and organisations.

2. Professionals

This major group includes occupations whose main tasks require a high level of professional knowledge and experience in the fields of physical and life sciences, or social sciences and humanities. The main tasks consist of increasing the existing stock of knowledge, applying scientific and artistic concepts and theories to the solution of problems, and teaching about the foregoing in a systematic manner. Most occupations in this major group require skills at the fourth ISCO skill level. This major group has been divided into four sub-major groups, 18 minor groups and 55 unit groups, reflecting differences in tasks associated with different fields of knowledge and specialisation.

3. Technicians and associate professionals

This major group includes occupations whose main tasks require technical knowledge and experience in one or more fields of physical and life sciences, or social sciences and humanities. The main tasks consist of carrying out technical work connected with the application of concepts and operational methods in the abovementioned fields, and in teaching at certain educational levels. Most occupations in this major group require skills at the third ISCO skill level. This major group has been divided into four sub-major groups, 21 minor groups and 73 unit groups, reflecting differences in tasks associated with different fields of knowledge and specialisation.

4. Clerks

This major group includes occupations whose main tasks require the knowledge and experience necessary to organise, store, compute and retrieve information. The main tasks consist of performing secretarial duties, operating word processors and other office machines, recording and computing numerical data, and performing a number of customer-oriented clerical duties, mostly in connection with mail services, money-handling operations and appointments. Most occupations in this major group require skills at the second ISCO skill level. This major group has been divided into two sub-major groups, seven minor groups and 23 unit groups, reflecting differences in tasks associated with different areas of specialisation.

5. Service workers and shop and market sales workers

This major group includes occupations whose main tasks require the knowledge and experience necessary to provide personal and protective services, and to sell goods in shops or at markets. The main tasks consist of providing services related to travel, housekeeping, catering, personal care, protection of individuals and property, and to maintaining law and order, or selling goods in shops or at markets. Most occupations in this major group require skills at the second ISCO skill level. This major group has been divided into two sub-major groups, nine minor groups and 23 unit groups, reflecting differences in tasks associated with different areas of specialisation.

6. Skilled agricultural and fishery workers

This major group includes occupations whose tasks require the knowledge and experience to produce farm, forestry and fishery products. The main tasks consist or growing crops, breeding or hunting animals, catching or cultivating fish, conserving and exploiting forests and, especially in the case of market-oriented agricultural and fishery workers, selling products to purchasers, marketing organisations or at markets. Most occupations in this major group require skills at the second ISCO skill level. This major group has been divided into two sub-major groups, six minor groups and 17 unit groups, reflecting differences in tasks associated with differences between market-oriented and subsistence agricultural and fishery workers.

7. Craft and related trades workers

This major group includes occupations whose tasks require the knowledge and experience of skilled trades or handicrafts which, among other things, involves an understanding of materials and tools to be used, as well as of all stages of the production process, including the characteristics and the intended use of the final product. The main tasks consist of extracting raw materials, constructing buildings and other structures and making various products as well as handicraft goods. Most occupations in this major group require skills at the second ISCO skill level. This major group has been divided into four sub-major groups, 16 minor groups and 70 unit groups, reflecting differences in tasks associated with different areas of specialisation.

8. Plant and machine operators and assemblers

This major group includes occupations whose main tasks require the knowledge and experience necessary to operate and monitor large scale, and often highly automated, industrial machinery and equipment. The main tasks consist of operating and monitoring mining, processing and production machinery and equipment, as well as driving vehicles and driving and operating mobile plant, or assembling products from component parts. Most occupations in this major group require skills at the second ISCO skill level. This major group has been divided into three sub-major groups, 20 minor groups and 70 unit groups, reflecting differences in tasks associated with different areas of specialisation.

9. Elementary occupations

This major group covers occupations which require the knowledge and experience necessary to perform mostly simple and routine tasks, involving the use of handheld tools and in some cases considerable physical effort, and, with few exceptions, only limited personal initiative or judgement. The main tasks consist of selling goods in streets, doorkeeping and property watching, as well as cleaning, washing, pressing, and working as labourers in the fields of mining, agriculture and fishing, construction and manufacturing. Most occupations in this major group require skills at the first ISCO skill level. This major group has been divided into three submajor groups, ten minor groups and 25 unit groups, reflecting differences in tasks associated with different areas of work.

0. Armed forces

Members of the armed forces are those personnel who are currently serving in the armed forces, including auxiliary services, whether on a voluntary or compulsory basis, and who are not free to accept civilian employment. Included are regular members of the army, navy, air force and other military services, as well as conscripts enrolled for military training or other service for a specified period, depending on national requirements. Excluded are persons in civilian employment of government establishments concerned with defence issues: police (other than military police); customs inspectors and members of border or other armed civilian services; persons who have been temporarily withdrawn from civilian life for a short period of military training or retraining, according to national requirements, and members of military reserves not currently on active service. Reference to a skill level has not been used in defining the scope of this major group.

Note. From *ISCO Summary of major groups,* by International Labour Organization, (2004), Geneva: International Labour Organization. Reprinted with permission.

Appendix G

This appendix presents the supplementary statistical analyses which were carried out in order to explore nationality differences in selected variables, namely gender, age, suicide method, and year of suicide. This was done in order to ascertain that the inclusion of both local and foreign nationalities in the study did not skew the findings, and that the findings appropriately reflected the local context and culture.

Nationality and gender

As indicated in the Results chapter's respective section on preliminary considerations, *nationality* was regrouped for these bivariate analyses. A crosstabulation of nationality and gender indicated that a larger percentage of local (80.7%) than foreign nationals (77.6%) were male. A larger percentage of foreign (22.4%) than local nationals (19.3%) were female. A chi-square test was conducted in order to test the statistical significance of these nationality differences in gender. There was not a significant association between nationality and gender $\chi^2(1) = 0.54$, $p = .462$. Moreover, it represented almost no effect V = .029.

Nationality and age

A simple box plot was produced in order to explore the distribution of ages for local and foreign nationalities. The median age was 45 for local nationals and 42 for foreign nationals. An independent samples *t*-test was conducted in order to compare mean ages between local and foreign nationalities. On average, locals had a greater mean age ($M = 46.59$, $SE = 0.76$), than foreigners ($M = 43.35$, $SE = 1.50$). However, this difference was not statistically significant $t(633) = 1.78$, $p = .076$. Moreover, it represented almost no effect $r = .070$.

Nationality and suicide method

A crosstabulation of nationality and suicide method indicated various differences, which are graphically represented in Figure G1. A chi-square test was conducted in order to test the statistical significance of these nationality differences in suicide method. There was a significant association between nationality and method $\chi^2(7) = 15.45$, $p = .031$. However, it represented a small sized effect V = .156.

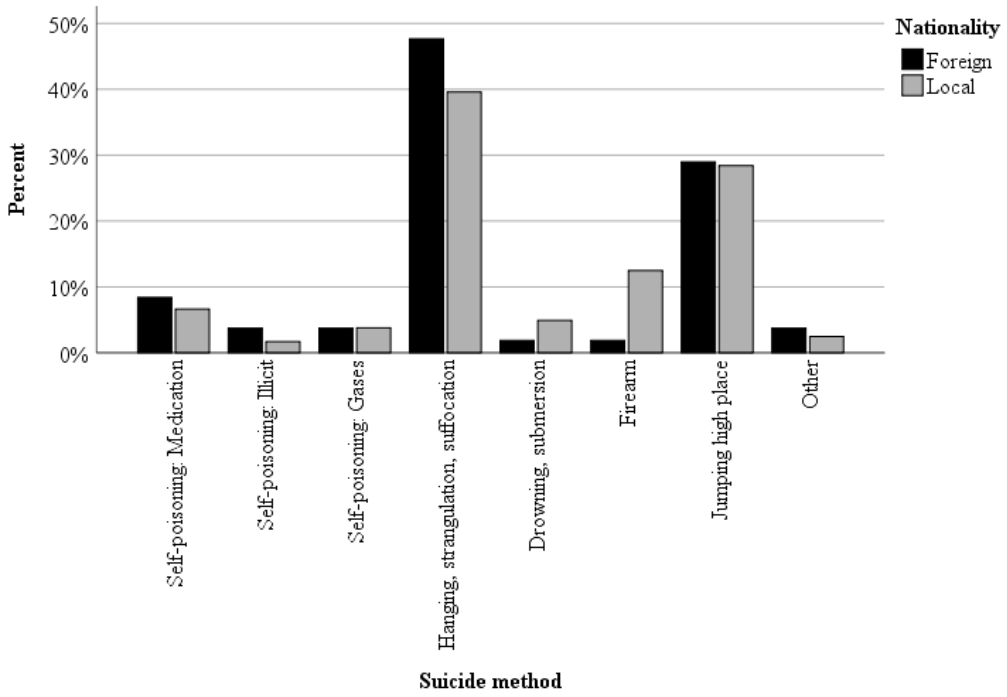

Figure G1. Nationality and suicide method clustered bar graph.

Year of suicide and nationality

The scatterplot in Figure G2 indicated an increase in the number of suicides for both local and foreign nationals over time. The year of suicide made a statistically significant contribution ($p = .024$) to predicting local national suicides, whereby every 5 years, the number increased by 2 ($b = 0.403$). The year of suicide made a significant contribution ($p < .001$) to predicting foreign national suicides, whereby every 4 years, the number increased by 1 ($b = 0.258$).

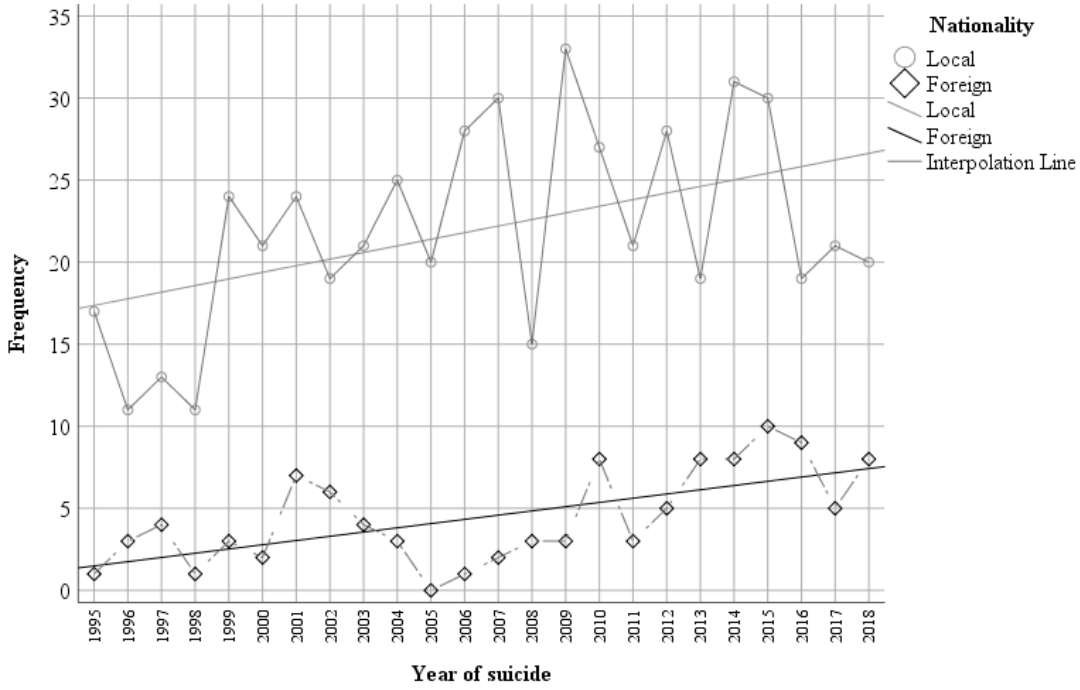

Figure G2. Year of suicide and nationality scatterplot.

Conclusion

There were no significant nationality differences in terms of gender, nor age. The statistically significant differences in some suicide methods had a small effect size. A significant increase in the number of suicides over time was found for both local and foreign nationals. Therefore, the local and foreign nationals in this study had similar trends for these main selected variables.

Appendix H

Submission of Ethics Self-Assessment Form

FREC dissertation proposal

2 messages

Kelsey Renaud Mon, Jun 4, 2018 at 9:41 PM
To: research-ethics.fsw@um.edu.mt

Dear Ms Agius,

Please find attached my FREC Form A and dissertation proposal.

Thank you and regards,
Kelsey Renaud

3 attachments

Dissertation proposal 04.06.2018.pdf
213K

Dissertation proposal form 04.06.18.pdf
189K

FREC Ethics Form A 04.06.18.pdf
586K

SWB FREC <research-ethics.fsw@um.edu.mt> Thu, Jun 14, 2018 at 11:11 AM
To: Kelsey Renaud

Dear Ms Renaud,

The scanned copy of the submitted Form A was received with thanks.

Regards,
Charmaine

Faculty Research Ethics Committee (FREC)
Faculty for Social Wellbeing
Room 113
Humanities A Building (Laws & Theology)
University of Malta
Msida MSD 2080

Ms Charmaine Agius
Tel: (+356) 2340 2237

Website: https://www.um.edu.mt/socialwellbeing/frec

Appendix I

Authorization for Access to Data

Figure I3 includes the confirmation of access to the National Mortality Register, through the Request for Record Level Data application submitted to the DHIR. Figure I4 includes the confirmation of access to the data from Felice et al. (2014)'s study. Figure I5 includes the confirmation of access to the post-mortem records. Figure I6 includes the confirmation of access to the medical records by the Data Protection Office at the health informatics department at MDH.

L-Università ta' Malta

Kelsey Elise Renaud <kelsey.renaud.11@um.edu.mt>

Suicide study - authorisation for access to register

13 messages

England Kathleen at Health Policy <kathleen.england@gov.mt> 10 July 2018 at 14:23

To: Kelsey Elise Renaud <kelsey.renaud.11@um.edu.mt>

Dear Kelsey,

From my end I can only give permission for data from the mortality register regarding suicides, as I am not responsible for the other sources of data mentioned below. The mortality register would include information on names, id, age, gender, MS and cause of death.

You would need to complete the attached form which would be vetted by our department and also attach your university ethics permission.

Regards

Kathleen

Kathleen England
Consultant Public Health
Department for Policy in Health
Health Information and Research

t +356 25599241 **e** kathleen.england@gov.mt
https://health.gov.mt | www.publicservice.gov.mt
Valletta 2018 - European Capital of Culture www.valletta2018.org

DHIR application

England Kathleen at Health Policy <kathleen.england@gov.mt> Tue, Dec 11, 2018 at 8:01 PM
To: Kelsey Renaud

Dear Kelsey,

Your request has been approved.

Regards

Kathleen

Figure I3. Access to National Mortality Register.

L-Università ta' Malta

Kelsey Elise Renaud <kelsey.renaud.11@um.edu.mt>

Suicide study - authorisation for use of data

3 messages

Felice Ethel at Health-Mental Health Services <ethel.felice@gov.mt> 5 July 2018 at 12:05
To: Kelsey Elise Renaud <kelsey.renaud.11@um.edu.mt>

Dear Kelsey,
I confirm that the data from ' Trends and patient characteristics of suicides in Malta' (Felice et al., 2014)' can be used.
Good luck
Thank you
Ethel

Figure I4. Access to Felice et al. (2014)'s data.

L-Università ta' Malta

Kelsey Elise Renaud <kelsey.renaud.11@um.edu.mt>

Suicide study - authorisation for access to reports

3 messages

Kelsey Elise Renaud <kelsey.renaud.11@um.edu.mt> 5 July 2018 at 12:05
To: marie.t.camilleri-podesta@um.edu.mt

Dear Prof Camilleri Podesta,

I hope this email finds you well.

Following Dr Bettenzana's correspondence, I'm hereby emailing you regarding my research proposal. Please find a brief summary of the proposed research below:

The aim of the proposed study would be to examine epidemiological data of persons who completed suicide in Malta, from 1995 to present. This study would incorporate the data from Felice et al. (2014)'s study, which includes data from 1995 to 2014. In addition, this study would gather data on completed suicides from 2014 to present. The post-mortem register, as well as relevant autopsy reports and psychiatric notes would be used in order to gather the data. The data that would be collected would include individuals' gender, marital status, age, date when suicide was completed, method of suicide, any mental health problems, substance use, previous suicide attempts, and previous contact with mental health services.

Could you kindly confirm that you authorise me to access the autopsy reports for the purposes of this research, under the supervision of Dr Bettenzana and Dr Darmanin Kissaun.

Thank you and best regards,
Kelsey Renaud.

Marie Therese Camilleri Podesta <marie.t.camilleri-podesta@um.edu.mt> 5 July 2018 at 19:53
To: Kelsey Elise Renaud <kelsey.renaud.11@um.edu.mt>

I authorise you to access the autopsy reports of the missing years. However, I would have to come with you to the mortuary to access these reports.

Marie Therese

Figure I5. Access to post-mortem records.

Falzon Ivan at Health-MDH <ivan.falzon@gov.mt> Mar 1, 2019, 10:51 AM

to Data, me

Please speak to the DPO in copy.

Data Protection at MDH <datapro.mdh@gov.mt> 6 March 2019 at 09:17

To: Kelsey Elise Renaud <kelsey.renaud.11@um.edu.mt>
Cc: Young Sharon at Health-MDH <sharon.young@gov.mt>, Baldacchino Cefai Margaret at Health-MDH <margaret.baldacchino-cefai@gov.mt>, Falzon Ivan at Health-MDH <ivan.falzon@gov.mt>

Dear Ms Renaud

Given that the data you are requesting pertains to ex patients who fell under the responsibility of MCH, note that from a data protection point of view you do not require clearance because GDPR is applicable for natural (live) persons.

However from an administrative point of view, because part of your exercise is carried out at the psychiatric POP note that MDH CEO's approval is required (which you have already obtained).

Also, note that all the data which you require, must be provided to you **already anonymised** by an authorised MDH employee. Availabilities of files is dependent on the Medical Records prerogative.

Regards

Simon Caruana

A/Data Protection Officer

Health Informatics

T +356 25455340

E simon.caruana@gov.mt

Mater Dei Hospital, Triq id-Donaturi tad- Demm, Msida, Malta MSD 2090 | Tel +356 2545 0000 | www.mdh.gov.mt

Figure I6. Access to medical records.

Appendix J

Normality of Distribution

The results from the Kolmogorov Smirnov test for age and gender, age and nationality, as well as age and method are presented in Table J4.

Table J4

Tests of normality

Variable	Category	*D*	*df*	*p*
Gender	Male	.062	509	.000
	Female	.074	126	.084
Nationality	Foreign	.084	107	.062
	Local	.050	528	.003
Method regrouped	Self-poisoning: Medication	.087	44	.200
	Self-poisoning: Illicit drugs	.196	13	.183
	Self-poisoning: Gases	.173	24	.062
	Hanging, strangulation, or suffocation	.072	260	.002
	Drowning or submersion	.126	28	.200
	Firearm	.077	68	.200
	Jumping from a high place	.057	181	.200
	Other	.135	17	.200

Appendix K

Regrouping of Variables

Suicide method was regrouped as follows:

1 Self-poisoning: Medication

2 Self-poisoning: Illicit drugs

3 Self-poisoning: Alcohol

4 Self-poisoning: Gases

6 Hanging, strangulation, or suffocation

7 Drowning or submersion

8 Firearm

10 Jumping from a high place

14 Other*

**Self-poisoning: chemicals, Self-poisoning: pesticides, Sharp object*, and *Other* were combined into *Other*.

Nationality was regrouped as follows:

3 Foreign

4 Local*

**Maltese* and *Gozitan* were combined into *Local*.

Appendix L

Prevalence of Suicide

The total general population of the Maltese Islands, including both local and foreign nationalities, was retrieved from the NSO (2015) for the years 1995 to 2013, and from the NSO (2018) for the years 2014 to 2017. I then used the general population figures in order to calculate the age-standardized suicide rates per 100,000 using the data from the study. These are presented in Table L5. The general population figure for 2018 was not yet published by the NSO at the time of this study (R. Debono, personal communication, May 28, 2019) and therefore was not calculated.

Table L5

Suicide prevalence rates

Year	Suicides	General population	Suicide rate per 100,000
1995	18	378,404	4.8
1996	14	381,405	3.7
1997	17	384,176	4.4
1998	12	386,397	3.1
1999	27	388,759	6.9
2000	23	391,415	5.9
2001	31	394,641	7.9
2002	25	397,296	6.3
2003	25	399,867	6.3
2004	28	402,668	7.0
2005	20	404,999	4.9
2006	29	405,616	7.1
2007	32	407,832	7.8
2008	18	410,926	4.4
2009	36	414,027	8.7
2010	35	414,989	8.4
2011	24	417,546	5.7
2012	33	422,509	7.8
2013	27	429,424	6.3
2014	39	439,691	8.9
2015	40	450,415	8.9
2016	28	460,297	6.1
2017	26	475,701	5.5

Appendix M

General Population Percentage Comparisons

I compared the findings for some of the demographic and psychiatric variables in the study to general population statistics, in order to be able to make appropriate interpretations of the findings. This was done by converting both sets of figures to percentages. Table M6 displays the gender variable in the study and in the general population (NSO, 2019).

Table M6

Percentage comparisons for gender

Gender	%	
	General population 2017	Study
Male	50.6	80.2
Female	49.4	19.8

Table M7 displays the gender differences in marital status in the study and in the general population (NSO, 2014).

Table M7

Percentage comparisons for gender and marital status

	%			
	General population 2011		Study	
Marital status	Males	Females	Males	Females
Single	53.95	46.05	54.6	45.4
Married	50.15	49.85	50.5	49.5
Widowed	20.97	79.03	12.0	88.0
Separated	47.30	52.70	69.4	30.6

Table M8 displays the age variable in the study and in the general population (NSO, 2019).

Table M8

Percentage comparisons for age

Age	%	
	General population 2017	Study
Under 29	33.66	20.16
30-49	28.79	39.69
50-69	24.89	29.45
Above 70	12.66	10.71

Table M9 displays the marital status variable in the study and in the local general population aged 16 and over (NSO, 2014).

Table M9

Percentage comparisons for marital status

Marital status	%	
	General population 2011	Study
Single	32.5	42.0
Married	56.2	46.5
Widowed	6.2	4.7
Separated	5.1	6.8

Table M10 displays the nationality variable in the study and in the general population (NSO, 2016). However, it was not possible to accurately compare the proportion of foreign nationals in the study to the general population, given that non-residents were not included in the NSO figures.

Table M10

Percentage comparisons for nationality

Nationality	%	
	General population 2015	Study
Local	92.9	83.1
Foreign	7.1	16.9

Table M11 displays the residence variable in the study and in the general population (NSO, 2019).

Table M11

Percentage comparisons for residence

Residence	%	
	General population 2017	Study
Southern Harbour	17.1	19.0
Northern Harbour	31.9	28.5
South Eastern	14.8	15.7
Western	12.8	11.7
Northern	16.5	15.3
Gozo and Comino	6.9	3.2

Table M12 displays the employment status variable in the study and in the local general population aged 15 and over (NSO, 2014).

Table M12

Percentage comparisons for employment status

	%	
Employment status	General population 2011	Study
Employed	48.3	40.7
Unemployed	3.7	18.0
Pensioners	14.6	26.1
Unable to work/boarded out	1.7	2.1
Homemakers	22.6	8.6
Students	7.1	4.5

Table M13 displays the occupation variable in the study and in the local general population aged 15 and over (NSO, 2014).

Table M13

Percentage comparisons for occupation

	%	
Occupation	General population 2011	Study
Armed Forces	0.9	0.6
Legislators, senior officials or managers	10.5	6.8
Professionals	15.7	8.6
Technicians or associate professionals	13.2	21.0
Clerks	11.3	1.9
Service and sales workers	19.7	12.3
Agricultural or fishery workers	1.3	1.9
Craft and trades workers	11.1	16.7
Plant or machine operators	6.6	9.3
Elementary occupations	9.6	21.0

Table M14 displays the mental illness diagnosis variable in the study and that of 818 admitted patients for whom an ICD-10 diagnosis is available in the annual reports (Mental Health Malta, 2017). The percentage for this variable in the study was calculated without the *undiagnosed depression* category in order to be able to compare the figures more accurately to the general inpatient population. It may be noted that the percentages for the general inpatient population do not total to 100%, as there were other diagnoses which were not present in the study.

Table M14

Percentage comparisons for mental illness diagnosis

Diagnosis	%	
	General inpatient population 2017	Study
Mood disorders	24.6	-
Mood disorders: Depressive	-	40.5
Mood disorders: Bipolar	-	7.4
Schizophrenia, schizotypal and delusional disorders	11.4	25.7
Neurotic disorders: Anxiety	12.1	6.8
Personality disorders	2.7	6.1
Psychoactive substance use	37.7	12.2
Dementia	-	1.4

Note. The dash symbol represents unavailable information.

Table M15 displays the type of psychiatric service variable in the study and in the general inpatient and outpatient populations accessing psychiatric services (Mental Health Malta, 2018). The percentage for the general psychiatric population could not be calculated given the figures available. It is important to note that the figure for POP is the number of appointments and not number of patients. Therefore, for this variable only, comparisons were made through observation of figures rather than comparison of percentages.

Table M15

Comparisons for type of psychiatric service

Service	General psychiatric population 2018	Study	
		%	*n*
MCH	2,154 admissions	41.1	62
Mental health clinics	4,619 patients	2.6	4
POP	9,307 appointments	6.6	10
PU	295 admissions	11.9	18
AE psych	-	5.3	8
Multiple psychiatric services	-	32.5	49