2022年12月　17卷4期

自殺防治學

Journal of Suicidology

December 2022　Volume 17　Number 4

DOI: 10.30126/JoS
ISSN: 2790-1645
Online Submission
https://www.ipress.tw/J0212
Taiwanese Society of Suicidology
社團法人台灣自殺防治學會

Journal of Suicidology

DOI: 10.30126/JoS

ISSN: 2790-1645

Online Submission: https://www.ipress.tw/J0212

Publisher: Taiwanese Society of Suicidology

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Journal of Suicidology December 2022 Volume 17 Number 4

CONTENTS

Suicide Prevention for A Variety of Demographic and Focused Populations

Chia-Yi Wu

Suicide death rates have been climbing from 6.4 to 9.6 per 100,000 among the young population aged 15-24 years according to government statistics in Taiwan in the recent five years during 2017 and 2021. Meanwhile, the middle-aged and elderly people have faced different biopsychosocial challenges during COVID-19. The suicide prevention strategies remain a broad coverage across the lifespan and base on local governments' plans of high-risk management and health promotion for those in need of protective effects toward suicide risks. Recent observations of world suicide prevention trend also reflect focuses on specific gender and age-group differences. For example, in UK "Suicide is the single biggest killer of men under the age of 45 in the country, but suicides among teenage girls and young women have almost doubled in recent years.", said Mental Health UK (https://reurl.cc/EXDgva). More research interest appeared to be put on various gender and age characteristics and/or other typical suicide risks such as psychosocial and environmental factors.

This volume in the Journal of Suicidology (JoS) collected several issues that can be differentiated into the young (university students, adolescents, young pregnant women), the middle-aged ("karojisatsu"), the elderly (repeated-suicide case series), and other risk-factor (internet addiction, long-term media report, treatment-resistant depression, pet loss, hospitalization) related topics. Specifically, more international opinions or comments revealed in this volume will draw interesting discussions toward advanced understanding of non-suicidal self-injury in adolescents and suicide statistics under the topic of "hidden suicide". A novel topic about pet loss and suicide ideation/plan among the pet owner is worth further attention and calls for more investigations under the popularity of pet ownership in this era. Moreover, three major topics related to the nationwide telephone survey on representative samples performed by the Taiwan Society of Suicidology every year have been published with different focuses, including internet use correlates, suicide reports profile (2012-2021), and suicidality identification. In terms of protective factors, resilience for internet users among the public and social support interventions for young pregnant women to prevent depression were presented in one original and one review article. The readers of the JoS will find it interesting and reflective from the abundant contents in this volume. We welcome more local and international readers to share with the world your valuable opinions or works about suicide research.

Keywords: diversity, novelty, lifespan, pet loss, suicide prevention, Taiwan.

(Journal of Suicidology 2022; 17(4): 303. DOI:10.30126/JoS.202212_17(4).0015)

Editor-in-Chief of the Editorial Committee of JoS, Taiwanese Society of Suicidology; School of Nursing, College of Medicine, National Taiwan University; Department of Nursing, National Taiwan University Hospital.

Editorials

Challenges of the COVID-19 Pandemic on Suicide Prevention Beyond Humans

Ming-Been Lee

Suicide involves a complex dynamic process with multiple factors in bio-psycho-socio-cultural and ecological interaction. By December 25, 2022, over 660 million people had been infected by SARS-CoV-2 and approximately 6.6 million had died from COVID-19 around the world. The COVID-19 pandemic crisis associated with the disease itself, social restrictions, and subsequent economic depression had negative impacts on people's mental health and heightened suicide risk. In the post-COVID-19 era, the long-term risk factors included a wide range of physical, psychosocial, and economical issues such as the confirmed cases with long COVID-19 and multiple life stressors. In particular, the mental health of the ethnic minority and low-income groups in some countries has been badly affected.

Although a report on suicide rates of 33 nations during the first 9–15 months of the pandemic indicated little evidence of increasing suicide risk in general, the potential impact on suicide rates cannot be overlooked for the affected demographic subgroups and regions with elevated risk prior to the pandemic. Therefore, the temporal trends in suicide rates among subpopulations need further investigation. Policymakers need to take preventive measures to protect the most vulnerable individuals, families, and communities after the pandemic. This is especially critical in the current challenges of global mental health issues due to extreme climate change, economic depreciation, civil unrest, and an armed conflict between nations. In Taiwan, 44% of the general population aged over 15 years suffered from various COVID-related stressors in terms of physical health, mental health, job or finances, interpersonal relationships, and 20% reported feeling stressed toward war. The effects of the COVID-19 pandemic were extensive and complicated. There were no consistent patterns of impacts on suicide risk because the extent and severity of COVID-19 as well as the preventive measures for viral spread and economic depreciation were greatly different between and within countries.

Other than the direct impacts of the COVID-19 disaster on humans, it was clinically common to see that pet death could inflict a significant emotional impact upon the owner and result in a complicated grief response and suicidality. Nowadays, pets are part of families all over the world. A recent study from Australia revealed that pets were a source of much-needed comfort and companionship during the pandemic and lockdown. In addition, parents and children who were feeling anxious and unsettled were more likely to have stronger bonds with their pets. The human-pet relationship was unique because pets gave their owners unconditional love and companionship and helped them manage loneliness and sometimes depression during the pandemic. In Taiwan, pets grew much faster than newborns; in 2021, the number of registered pet dogs and cats in Taiwan exceeded the young population aged 0-14 years first time in history. Similarly, about 70 percent of households owned a pet in Australia with a 10 percent increase during the pandemic.

Pets tended to enhance human well-being in both psychological and physical aspects such as enhancing self-esteem and increasing physical activity. There is a strong emotional tie between the pet and its owner. The death of a companion pet could be as devastating as the loss of a human significant other. The pandemic created a highly stressful environment for some families who were working and learning from home with pets in the absence of usual social support and outlets. A recent study conducted during a strict lockdown period of the pandemic in Australia noted that pet ownership was significantly associated with poorer quality of life. Thus, pets might increase owners' burden and contribute to poorer quality of life. Younger age, female gender, and pre-existing health conditions were reported as risk factors for a significant increase in mental health problems in the first year of the pandemic (WHO, Scientific Brief, 2022). According to the pet consumption behavior survey in Taiwan, female owners were 1.7 times more than male owners. The precise role and impacts of pets within the family in addition to demographics, internal and external stressors are worthy of further exploration in the context of psychological well-being and suicide prevention.

Keywords: COVID-19, suicide, suicide prevention, pet ownership, pet death, suicide risk.

(Journal of Suicidology 2022; 17(4): 304. DOI:10.30126/JoS.202212_17(4).0016)

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Letter to Editor

Karojisatsu (Suicide Caused by Overwork) in the Nordic Countries. A call for Research

Jens Peter Eckardt

Abstract: In the light of considerable research from Japan, the author hereby calls on the health and research community to also draw research interest to the Nordic countries on karojisatsu (suicide caused by overwork). No study has so far examined karojisatsu in the Nordic countries and to date no cross-national studies have yet been conducted. At the present time, looking at existing research from Japan and its relevance to psychiatric practice, the impact of work environment and the field of suicide prevention, it appears as a phenomenon that cannot be limited exclusively to the field of some countries or cultures. Rather, it may also concern several characteristics of a modern society like Denmark, Norway or Sweden. With the Japanese experiences, assessment tools, policy strategies and intervention programs, karojisatsu should therefore undergo research investigations in the Nordic countries as well. Karojisatsu may be a hidden factor into today's suicide numbers and to grasp its relevance and accurate awareness of the current situation, Nordic countries should be included in future studies.

Keywords: suicide, overwork, Japan, the Nordic countries, research.

(Journal of Suicidology 2022; 17(4): 305-307. DOI:10.30126/JoS.202212_17(4).0001)

In 2021, the sum of Japanese individuals committing suicide related to their work environment reached almost 2000 [1]. Suicide induced by extraordinarily stressful work conditions is called karojisatsu ("overwork suicide") in Japan and is found in all types of workplaces and among all corporate ranks [2-4]. The phenomenon has been created to describe the plight of employees who fall into depression or lose their mental balance, leading them to end their lives [5]. Prior to their death they may have been exposed to extremely long working hours, a poor working environment with no holidays, an enormous responsibility, an extraordinary pressure to achieve difficult goals or under a heavy workload [3]. According to Butler what makes karojisatsu so unique is that the individuals who are committing karojisatsu do so before their physical health fails them [3][5]. Often these excessively working but friendly, kind, diligent, punctual, and responsible – predominately – males may kill themselves due to feeling they are not meeting the expectations of their workplace or social status (so-called altruistic suicide), and at the same time feeling powerlessness for causing their close relatives distress and misfortune by collapsing as a worker and a masculine man [5]. The possible causing factors are complex and typically has its own exclusive and private explanation, but as Kawanishi argues, it might "occur as a result of the intricate dance between individual willingness and society's compulsion as well as a growing mismatch between traditional values and the changing reality" [3]. Although historical and cultural reason holds somewhat true, other factors like the human factor in the Japanese workplace, service overtime, a performance-based evaluation systems and the Japanese work philosophy should also be taken into consideration [3]. See also Amagasa et al [6].

Suicide resulting from over-work (like long working hours) have become an occupational health threat particularly in Asian countries [7-8]. However, no study has ever examined karojisatsu in the Nordic countries and to date no cross-national studies have yet been conducted. In general, research on overwork concerning long working hours is increasing on a global scale [9-14] to which Nordic studies is also flourishing. Long working hours seem not to be a major health risk factor at the population level in the Nordic countries, where the incidence of long hours is very low [15]. For instance in Denmark, no association to long working hours is found regarding mortality rates [16], ischaemic heart disease and antihypertensive drug usage [17], psychotropic drug usage [18] and it is not a predictor of mental ill health [19]. Despite, however, the magnitude of health risk factors is modest at the population level, studies still indicate that long working hours are associated with an elevated risk of early cardiovascular death and hospital-treated infections, including diabetes, musculoskeletal disorders and injuries, before age 65 in Finland, Sweden, and Denmark [20], and additionally associated with haemorrhagic stroke in Denmark [21].

In conjunction with karojisatsu, work-related suicide has also come to the attention of the Nordic research community in recent years. In Denmark a study suggests an association between exposure to workplace bullying and subsequent suicidal behavior, including suicide attempt and death by suicide [22]. In Norway a

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Received: 17 August 2022; **Accepted:** 13 September 2022.

study shows that workplace bullying may be a precursor to suicidal ideation [23], whereas another demonstrates that exposure to physically intimidating behaviors is also a risk factor for suicidal ideation [24]. In Sweden a study indicates that passive occupations are associated with risk for suicidal behavior [25], while another supports that workplace sexual harassment is associated with suicidal behaviour [26].

Research on how job stressors affect suicidal behavior can be considered in its infancy. Studies are surrounded by research gaps and methodological limitations [27] to limited research among working men [25] and conflicting studies too [28]. Therefore, highlighting the above Nordic studies are neither consistent nor exhaustive but merely serve as examples in work-related suicide research. Despite limitations, the amount of policy and research in recent years have supported the idea that poor working conditions are related to risk of suicide ideation [29]. But the question remains: Can overwork contribute to people taking their own lives in the Nordic countries similar to Karojisatsu in Japan? Are they committing karojisatsu before their physical health fails them and if so, why? Because suicide is a complex problem and numerous factors contribute to suicide [30] including poor work environment, there is always a need for cross-national research by intuitively considering trans-cultural theories, hypothesis, and workplace observations as well. This could include flexible and trans-cultural adaptations and countermeasures on karojisatsu-similar incidents in accordance with emergence of specific job stressors on overwork-suicides in the Nordic countries. That being the case a continuous international cooperation and interdisciplinary research to suicide caused by overwork will be of crucial significance.

References

1. Kettenhofen L: Number of suicides related to problems at work in Japan from 2011 to 2020. 2022 https://www.statista.com/statistics/622325/japan-work-related-suicides/
2. Inoue K & Matsumoto M: Karo jisatsu (suicide from overwork): a spreading occupational threat. Occup Environ Med. 2000;57(4):284-285.
3. Kawanishi Y: On Karo-Jisatsu (Suicide by Overwork): Why Do Japanese Workers Work Themselves to Death? Int. J. Ment. 2008;37(1):61–74.
4. Hori D, Takao S, Kawachi I. et al: Relationship between workplace social capital and suicidal ideation in the past year among employees in Japan: a cross-sectional study. BMC public health 2019;19(1):919.
5. Butler H: "Work Yourself to Death: The Honorable Way to Die for the Sararіiman," Historical Perspectives: Santa Clara University Undergraduate Journal of History, Series II 2020;25(7).
6. Amagasa T, Nakayama T, Takahashi Y: Karojisatsu in Japan: characteristics of 22 cases of work-related suicide. Occup Health 2005;47(2):157-164.
7. Lee HE, Kim I, Kim HR, Kawachi I.: Association of long working hours with accidents and suicide mortality in Korea. Scand J Work Environ Health 2020;46(5):480-487.
8. Yamauchi T, Sasaki T, Yoshikawa T, et al: Incidence of overwork-related mental disorders and suicide in Japan. Occup Med (Lond) 2018;68(6):370-377.
9. Descatha A, Sembajwe G, Pega F, et al: The effect of exposure to long working hours on stroke: A systematic review and meta-analysis from the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury. Environ Int 2020;142:105746.
10. Li J, Pega F, Ujita Y, et al: The effect of exposure to long working hours on ischaemic heart disease: a systematic review and meta-analysis from the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury. Environ Int 2020;142:105739.
11. Pachito DV, Pega F, Bakusic J, et al: The effect of exposure to long working hours on alcohol consumption, risky drinking and alcohol use disorder: a systematic review and meta-analysis from the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury. Environ Int 2021;146:106205.
12. Rugulies R, Sørensen K, Di Tecco C, et al: The effect of exposure to long working hours on depression: a systematic review and meta-analysis from the WHO/ILO Joint Estimates of the Work-related Burden of Disease and Injury. Environ Int 2021;155:106629.
13. Virtanen M, Jokela M, Madsen IE, et al: Long working hours and depressive symptoms: systematic review and meta-analysis of published studies and unpublished individual participant data. Scand J Work Environ Health 2018;44(3):239-250.
14. Virtanen M, Jokela M, Nyberg ST, et al: Long working hours and alcohol use: systematic review and meta-analysis of published studies and unpublished individual participant data. BMJ 2015;350:g7772.
15. Riekhoff A, Krutova O, Nätti J: Working-hour Trends in the Nordic Countries: Convergence or Divergence? Nord. J. Work. Life Stud 2019;9(3):116056.
16. Hannerz H, Soll-Johanning H: Working hours and all-cause mortality in relation to the EU Working Time Directive: a Danish cohort study. Eur J Public Health 2018;28(5):810-814.
17. Hannerz H, Larsen AD, Garde AH: Long weekly working hours and ischaemic heart disease: a follow-up study among 145 861 randomly selected workers in Denmark. BMJ Open 2018;8(6):e019807.
18. Hannerz H, Albertsen K: Long working hours and use of psychotropic medicine: a follow-up study with register linkage. Scand J Work Environ Health 2016;42(2):153-161.
19. Hannerz H, Albertsen K, Nielsen ML, et al: Long working hours and psychiatric treatment: a Danish follow-up study. Scand J Work Environ Health 2021;47(3):191-199.
20. Ervasti J, Pentti J, Nyberg ST, et al: Long working hours and risk of 50 health conditions and mortality outcomes: a multicohort study in four European countries. Lancet Reg Health Eur 2021;11:100212.
21. Hannerz H, Albertsen K, Burr H, et al: Long working hours and stroke among employees in the general workforce of Denmark. Scand J Public Health 2018;46(3):368-374.
22. Conway PM, Erlangsen A, Grynderup MB, et al: Workplace bullying and risk of suicide and suicide

attempts: a register-based prospective cohort study of 98 330 participants in Denmark. Scand J Work Environ Health 2022;48(6):425-434.
23. Nielsen MB, Nielsen GH, Notelaers G, Einarsen S: Workplace Bullying and Suicidal Ideation: a 3-Wave Longitudinal Norwegian Study. Am J Public Health 2015;105(11):e23-e28.
24. Nielsen MB, Einarsen S, Notelaers G, Nielsen GH.: Does exposure to bullying behaviors at the workplace contribute to later suicidal ideation? a three-wave longitudinal study. Scand J Work Environ Health 2016;42(3):246-250.
25. Åberg M, Staats E, Robertson J, et al: Psychosocial job stressors and risk of suicidal behavior - an observational study among Swedish men. Scand J Work Environ Health 2022;48(6):435-445.
26. Magnusson Hanson LL, Nyberg A, Mittendorfer-Rutz E, et al: Work related sexual harassment and risk of suicide and suicide attempts: prospective cohort study. BMJ 2020;370:m2984.
27. Greiner BA, Arensman E: The role of work in suicidal behavior - uncovering priorities for research and prevention. Scand J Work Environ Health 2022;48(6):419-424.
28. Younès N, Rivière M, Plancke L, et al: Work intensity in men and work-related emotional demands in women are associated with increased suicidality among persons attending primary care. J Affect Disord 2018;235:565-573.
29. Milner A, Witt K, LaMontagne AD, Niedhammer I: Psychosocial job stressors and suicidality: a meta-analysis and systematic review. Occup Environ Med 2018;75(4):245-253.
30. Hawton K, van Heeringen K: Suicide. Lancet 2009;373(9672):1372-1381.

Review Articles

Recent Advances in Understanding Non-Suicidal Self-Injury in Adolescents

Linen Nymphas Lin [1,2*] and Ming-Been Lee [3,4,5]

Abstract: Non-suicidal self-injury (NSSI) is a prevalent and alarming behavior among adolescents. The aims of this narrative review are to present updated literature on epidemiology, risk factors and possible etiology, together with interventions with special consideration about the period of adolescence. Results demonstrate prevalence of around 16.9% in the community and 60.0% in clinical settings respectively. The main risk factors for NSSI include previous NSSI history, adverse experiences in childhood, bullying, social contagion, accompanying mental illnesses, as well as the neurobiological basis of abnormal stress processing and pain threshold. Using the Four-Function Model to delineate NSSI facilitates formulation and subsequent intervention. The double-edged effect of online activities on NSSI deserves further exhaustive clarification. There has been no particular type of psychotherapy confirmed to be superior to the others. Psychoactive prescription has yet been found to provide specific efficacy among adolescents engaging in NSSI. Lacking investigations into NSSI prevention programs warrant further approaches. Recommendations for future direction of studies are standardizing the conceptualization of NSSI, gathering evidence for etiology of the condition, and exploring prevention measures. Suggestions for principles of practice include paying attention to suicidality, warding off stigmatization by psychoeducation to the public, and avoiding sex stereotypes.

Keywords: non-suicidal self-injury (NSSI), self-harm, adolescent, suicide.

(Journal of Suicidology 2022; 17(4): 308-318. DOI:10.30126/JoS.202212_17(4).0007)

Introduction

Non-suicidal self-injury (NSSI) is strongly associated with suicidal behavior [1] and thus must not be undervalued regarding suicidal prevention. NSSI is defined as a direct, deliberate, socially or culturally unacceptable self-inflicted injury to body tissue without suicidal intent [2-4]. By this definition, NSSI includes cutting or slashing, hitting, scratching, burning, compulsively headbanging, trichotillomania, skin picking, carving, scraping, and self-inflicted fractures resulting in direct damage of body, yet excludes indirect self-injurious behaviors (e.g., starving or binge eating, substance misuse, unprotective sex behavior, reckless driving, fighting, and gambling), accidental injuries, socially acceptable behaviors (e.g., tattoo), physical harm in religious or cultural rituals, and suicidal attempts. The US classification system (Diagnostic and Statistical Manual of Mental Disorders, DSM-5) defines a frequency criterion as "on more than five days within the preceding 12 months" [5]. However, the International Classification of Diseases for Mortality and Morbidity Statistics (ICD-11) includes a description of NSSI but does not define the frequency [6]. Aside from its role in curative medicine and mental health, NSSI is also relevant in the context of faked crime [7].

Despite the increasing number of research on NSSI in adolescence [8], it is still essential to update the latest literature to provide insight for families of affected youths, teachers, child, adolescent psychiatrists, psychotherapists, social workers,youth welfare workers, and other professionals working with youths in this ever-changing era. This article will summarize recent advances in the understanding of NSSI in adolescents, with a focus on epidemiology, risk factors and possible etiologies, as well as principles of assessments and interventions.

Epidemiology

Although little is known about the prevalence of NSSI prior to 2000, the prevalence rate in publications did not vary from different countries over time after adjusting for methodological factors [9]. Cipriano et al. [10] indicated 7.5–46.5%, a wider range, of youths in the community had engaged in NSSI from a later systematic review. A Swedish community study revealed much higher features: 35.6 % of the adolescents, aged 15 to 17, reported they had at least one NSSI in the past year; and the prevalence rates of reported only one, 2-5, 6-10, and more than 11 episode(s) of NSSI were 14.2%, 30.8%, 13.8%, and 41.2% respectively [11]. The

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Received: 21 November 2022; **Accepted:** 6 December 2022.

results of independent systemic reviews revealed NSSI prevalence in adolescents was 16-18% [9, 12]. As for community adolescents meeting NSSI disorder criteria in DSM-5, the prevalence rates are lower and the range can vary from 1.5% to 6.7% [11, 13, 14]. Regarding the lifetime prevalence of NSSI, a meta-analytic estimate was 16.9% (95 C.I.: 15.1-18.9) among 12- to 18-year-old youths [15]. In adolescent psychiatric setting, the NSSI prevalence rate was up to 60.0% [16] and this situation could occur with or without psychiatric diagnosis [17, 18]. The possible co-existent mental disorder includes, but not limiting to, affective disorders, anxiety disorders, substance use disorders, posttraumatic stress disorder (PTSD), and personality disorder.

Regarding the longitudinal development of NSSI, Gillies et al. [15] indicated the average age of the first self-injury was around 13 years. Plener et al. [8] provided evidence for a steady increase in rates of NSSI with a peak around 15-16 years and decline around 18 years. This feature is similar to repetitive NSSI [7]. However, the onset age and developmental course of NSSI vary considerably [19].

Though NSSI can cease in late adolescence or early adulthood without significant problems later in life in most affected individuals [20], youths with repeating NSSI behaviors appear to be at higher risk for emotional dysregulation [20] and substance misuse [21] even after cessation of NSSI. In addition, the onset of NSSI in adolescence may predict the development of future borderline personality disorder [22], suicidal ideation [23], and suicide attempts [24, 25]. More, Carroll et al. [26] reported a higher risk of suicide among individuals engaging in NSSI on body parts other than arms and wrists in a prospective cohort study. In short, the NSSI, a prevalent and disquieting behavior among adolescents, deserves more attention in terms of mental health care and health promotion.

Risk Factor, Protecting Factor, and Etiology

Some risk factors and hypothetical etiologies of NSSI have been identified. For example, Fox et al. [27] published a meta-analysis showing the prior history of NSSI (OR = 5.95), cluster B personality (OR = 5.93), and hopelessness (OR = 3.08) yielded the strongest predicting effects; and other statistically significant risk factors were female sex, parental psychopathology, family functioning and structure, abuse, prior NSSI or exposure to peer NSSI, prior suicidal thought or behavior, general psychopathology, depression or internalizing symptoms, eating disorder, affect dysregulation, impulsivity, prediction of engaging in future NSSI, and externalizing symptoms.Regarding the raising concerns about adolescents in the uniquely challenging COVID-19 pandemic, De Luca et al. [28] reported the results of path analyses of a longitudinal study revealing that adolescents, with severe internalizing symptoms and weak regulatory emotion about self-efficacy before the COVID-pandemic, were more likely to be affected by COVID-19-related stress. As a result, the risk of getting involved in NSSI has increased.

Demographic Factors

As mentioned formerly, the age of initial NSSI is most common in early to mid-adolescence, increasing with age, and usually discontinues in late-adolescence or young adulthood.Concerning the link between sex and prevalence of NSSI, results of the meta-analysis and US national survey showed NSSI in adolescence more often among girls (odds ratio = 1.5 to 2) [15, 29, 30]. Some studies, however, concluded no significant sex differences in the prevalence [31-34]. This inconsistency implies the possibilities that: (1) girls may have a preponderance to report having injured themselves in studies; (2) more girls than boys seek help for self-injury; (3) different methods for self-injury make them easy (e.g., a girl with slashing wound over theforearm) or difficult (e.g., a boy without open wound after punching a wall) to identify self-injury; and (4) the researchers find what they look for [35]. As for the association between sex and method of NSSI, data from representative samples of 11 European countries indicated the most popular method for girls and boys was cutting and hitting against a wall respectively [36]. Further, some evidence suggested that boys' self-injury might be more persistent and intense [33, 37]. These findings demonstrated the interaction between sex and NSSI would be more intricate than expected.

Psychosocial Factors

Intrapersonal psychological aspect

Some justified psychological risk factors for NSSI included low self-esteem, self-loathing, self-critical, negative self-image, perfectionistic, and irrational guilt or shame [38-40]. These feelings may hamper establishment of therapeutic alliance [35] and make it more difficult to intervene. A functional analysis helps formulate the NSSI according to what went before the incident and what follows after the incident [41]. Klonsky [42] reviewed empirical research about the functions of NSSI and illustrated seven functions including the affect-regulation model, self-punishment model, anti-dissociation model, anti-suicide model, interpersonal-influence model, interpersonal-boundaries model, and sensation-seeking model.

Further, Nock and Prinstein [43] have developed a practically functional model to delineate NSSI by the four primary categories (the Four-Function Model). This well-known proposed model illustrated how NSSI can be understood based on two dichotomous dimensions: automatic (intrapersonal) versus social (interpersonal) and positive (followed by a desirable stimulus) versus negative (followed by an adversative stimulus). For instance, automatic-negative reinforcement refers to an individual using NSSI to reduce psychological pain, while an individual engages in NSSI to create a wanted physiological status in automatic-positive reinforcement. Social-negative reinforcement is the person using NSSI as a means to escape from social obligations, while social-positive reinforcement describes the experience of receiving attention from surroundings. In a meta-analysis, Taylor et al. [44] indicated that intrapersonal functions of NSSI are most common ,which affect-regulation models of NSSI. In addition, many studies

showed the most common function when engaging in NSSI would be automatic negative reinforcement [11, 22, 45]. However, it is highly recommended that detailed evaluation for every single NSSI behavior about the reasoning, meaning, intensity, frequency, and context to better modify individualized coping strategies one has developed [46].

Familial and Interpersonal psychological aspects

Results from different studies supported an association between elevated risk for engaging in NSSI and experience of adverse childhood events (ACEs), such as neglect [47-49], critique or apathy [16, 50], abuse [47-49], deprivation [47, 48], and maltreatment [49]. Some researchers demonstrated more in-depth findings in this field, such as only the experience of emotional abuse [51, 52] or sexual abuse [53-55] remained a significant association. Some of the parental factors, such as lower degree of compatibility and diligence, self-criticism, attention deficit hyperactivity disorder (ADHD), and alcohol misuse, were associated with their children's NSSI [56]. Another study on parenting patterns suggested that only indirect forms of childhood mistreatment (e.g., as a bystander of domestic violence), are associated with NSSI; but direct forms (e.g., as a victim of physical abuse) are not [50]. Notably, the traumatic symptoms, such as anxiety, depression, shame, guilt, anger, disgust, dissociation, and self-derogation, may mediate the association between the traumatic experiences and NSSI [57]. Besides, ambivalent and disorganized attachment is frequently found among those who practice self-injury [58]. Except for determinants of family dynamics listed above, research on the association between NSSI and other potentially traumatic childhood adversities, such as material deprivation (e.g., family poverty, long-termed parental unemployment) and loss or threat of loss (e.g., physical illness, parent's passing away), is relatively limited.

Bullying has been confirmed to increase the risk for repeated NSSI in longitudinal [59, 60] and cross-country [60, 61] studies. More, Lereya et al. [60] indicated the experience of being bullied by peers during childhood or adolescence would be more predictive of adulthood NSSI than parental maltreatment. The peer influence in adolescence has been acknowledged and the result of a systematic review verified the association between peer interaction from social contagion and NSSI [62]. The study further emphasized stronger effect of social contagion (e.g., peers being exposed to NSSI or engaging in NSSI on the Internet) on initial NSSI, compared with the relationship between intrapersonal functions and maintenance of NSSI.

Socio-cultural aspect

An increasing number of adolescents cope with various aspects of their lives by NSSI. Following the abovementioned social contagion effect, widely spread of NSSI-related content from internet, like search terms on Google [63] and viewed photographs or videos on YouTube [64], increased interest to researchers and practitioners. A recent meta-analysis further showed medium effect sizes for associations between self-injurious thoughts and behaviors (SITBs) and some specific social media constructs such as cybervictimization, SITBs-related social media use, and problematic social media use [65]. Also, certain aspects of socio-cultural influences, such as youth subculture [66], identification in specific contexts [67], and non-heterosexual orientation [68-70], have been demonstrated to increase the risk of involving in NSSI.

Neurobiological Factors

As described above, NSSI most commonly develops in early to mid-adolescence, increasing with age, and usually ceases in late-adolescence or young adulthood. This pattern might be associated with levels of impulsivity and due to emotional reactivity in the brain developmental processes [71, 72]. However, most research on neurobiological factors about self-harm behaviors have been conducted in adults with borderline personality disorder [73-75] and the longitudinal studies are few and far between. Therefore, the interpretation of these correlations should be cautious.

Neurochemical aspect

Some evidence confirmed the linkage between NSSI and the hypothalamic-pituitary adrenocortical (HPA) axis, such as higher cortisol awakening responses [76], lower post dexamethasone suppression test (DST) cortisol levels (suggesting an efficient negative feedback loop) [77], stronger cortisol response to pain stimuli [78], and decreased cortisol levels in response to the Trier social stress test (indicating hypo-responsiveness of the HPA axis in acutely stressful situations) [79]. Besides, released catecholamines coming from the activated autonomic nervous system (ANS) during exposure to stress are also proven [80].

The relationship between reduced serotonin level and increased impulsivity, aggression, suicide attempts, as well as NSSI has been studied too. One of the genetic studies revealed that adolescents, who carried at least one short allele in the serotonin transporter-linked polymorphic region (5-HTTLPR) of the SLC6A4 gene, presented with an increased likelihood of involving in NSSI when exposed to severe interpersonal stress [81]. This finding was partially supported by the conceptualization that SSRIs may reduce the risk of NSSI by alleviating impulsivity , aggression, anxiety, and depression [80]. As for dopamine, some researchers suggested the probable link between reduced dopamine and NSSI [82]. However, another study provided a contrary result [83] and dopamine antagonists have been administrated to treat NSSI in some clinical contexts [80]. Hence, further studies on the complex interaction between dopamine and NSSI are needed.

In regard to the perception and procession of pain, there existed inconsistent results about pain threshold [78, 84, 85]. One study on endogenous opioid revealed lower levels of beta-endorphin and Met-enkephalin in the liquor cerebrospinalis of individuals engaging in NSSI [86]. This suggests their deficits in response to outer stimuli. However, Nixon et al. [87] indicated endogenous opioids remove physical pain ("pain offset relief") instantly in NSSI [88]. This process can result in simultaneous beneficial effect on emotions. Yates [89] proposed "pain hypothesis" and "addiction hypothesis" for help

understanding the ambiguity. On the one hand, the pain hypothesis refers to innate or result from chronic and severe stress associated with lower levels of endogenous opioids. This condition can make adolescents vulnerable to NSSI and reacting with of increased endogenous opioids level. On the other hand, the addiction hypothesis illustrates the released endogenous opioids leading to physiological dependency with repeated incidents of NSSI. However, further inspection is still needed to clarify those inconclusive findings.

Neuroanatomical and Neurocircuit aspect

An fMRI study addressed the altered neural pattern in the limbic system when processing emotional stimuli in adolescents with NSSI [90]. Groschwitz et al. [91] found enhanced neural processing of social exclusion, mainly over the medial prefrontal cortex (mPFC) and the ventrolateral prefrontal cortex (vlPFC), in depressed adolescents with NSSI, and this finding can indicate their particular sensitivity regarding social exclusion. Osuch et al. [78] added evidence of greater association between feelings of relief and reward-related areas. The research also showed reduced functional connectivity between right OFC and anterior cingulate cortex among NSSI youths. These findings imply impaired emotional regulation in the developing brain of youths with NSSI.

Considering the parallel processing neurocircuit pathway during stress response in NSSI individuals, it takes place as the thalamus transmits impulses to the amygdala (releasing corticotropin-releasing factors, followed by triggering the release of adrenocorticotropic hormone, in turn releasing cortisol; reflexive and rapid response outside conscious awareness) and to the prefrontal cortex (comparing incoming information with previous experiences; complex and longer process of mentalizing) at the same time [80]. This helps explain why some emotionally dysregulated subjects react panicking (the hyperactive amygdala) with relatively unstable mentalizing capacity (the "precognitive emotions" or the "unmentalized effects") [92]. Møhl [80] also supported the notion that hyperactive amygdala may predispose the evolution of NSSI as a coping strategy because of the limitation of generating rational alternatives. However, it is not conceivable to reach a definite conclusion on causal relationships due to the lack of longitudinal studies.

Intelligence Quotient

Chang et al. [93] analyzed data on a population-based prospective UK cohort and indicated higher Intelligence Quotient (IQ), both verbal IQ and performance IQ, were associated with an increased risk of NSSI. Regardless of reporting bias and chance finding, this finding lends support to the understanding of loneliness, social isolation, stressful reaction, and depression from earlier psychological maturation of higher IQ adolescents [93]. Additional evidence showed worse neurocognitive performance, employing propensity score matching for IQ, in youths engaging in NSSI [94]. Further longitudinal studies, including a clinical control group, are needed to clarify the contribution or interaction among IQ, neurocognitive performance, and NSSI.

Mental Disorders

The NSSI, a transdiagnostic symptom and not an independent entity in the ICD system, is associated with some mental disorders [13]. Hawton et al. [95] conducted a systematic review and indicated that psychiatric disorders were identified in 81.2% (95% CI 60.9-95.5%) of self-harmed adolescents presenting to hospitals; and the most frequent disorders were anxiety, depression, ADHD, conduct disorder, and alcohol abuse. Other co-existed mental disordered in the context of NSSI included affective disorders, borderline personality disorder, substance use disorders, externalizing disorders, PTSD, and avoidant personality disorder [96]. The link between mental illness and NSSI may be bi-directional [97].

Protecting Factors

Compared with risk factors, protection or resilience factors of developing NSSI are less understood [98]. Some intrapersonal protective factors include: optimism, realistic self-esteem, internal locus of control, a sense of meaning and purpose in life, good verbalization skills, productive activity, and the ability to form attachments to others [99]. Also, interpersonal factors that add protection against developing NSSI include support from parents [100], a close and cohesive family situation, and social support [98, 101].

Regarding the Internet, online activities may not be notorious all the time. For example, one-third of 14 to 25 years NSSI youths reported their previous online help-seeking for NSSI [102]. Additional benefits from online activities include mitigation of social loneliness, encouragement, emotional self-disclosure, and inhibition of NSSI urges [103]. These results support to the design, incorporation, and delivery of online assessment and treatment resources for adolescents with NSSI.

Summary

Taken together, pubertal age, female sex, adverse childhood experiences of emotional abuse or sex abuse, bullying, and improper social exposure to NSSI are possible risk factors for developing NSSI in youths. Neurobiological studies indicate abnormalities in the HPA axis, the endogenous opioid system, and the neural processing of stress response. Formulating the individualized functionalities of NSSI may help figure out affected adolescents' inner experience. The representative risk factors are summarized in Table 1. Refining specific protecting factors to work out measures for intrafamilial, emotional, behavioral, and social adaptation should be considered too.

Assessment

The contact between the individual with NSSI and the health provider is crucial for the subsequent intervention and prognosis [104]. And the first step of assessment must be a physical examination of the depth of the wound(s) and necessity for surgical procedure. The suggested principles of assessment, as thorough and careful as possible, must include being open-minded and

Table 1. Risk factors for non-suicidal self-injury (NSSI) in adolescence.

Demographic factors
Female sex
Psychosocial factors
Past history of NSSI or experience of NSSI among peers
Past history of suicidal thought or behavior
Prediction of engaging in future NSSI
Hopelessness
Low self-esteem, negative self-image, perfectionistic, irrational guilt
Adverse childhood experiences
Emotional abuse or sexual abuse
Neglect
Parental mistreatment
Familial aspects
Parental psychopathology
Health problems in the family
Separated parents
Conflict in parent–child relationship
Bullying
cybervictimization, SITBs-related social media use, problematic social media use
Neurobiological Factors
Abnormalities in the HPA axis, the endogenous opioid system, and the neural processing of response to stress
Higher IQ
Mental disorders and associated symptoms
Anxiety disorders
Affect regulation problems, depressive symptoms
Eating disorders
Substance misuse
Internalizing behavioral abnormalities
Aggression, externalizing behavioral abnormalities
Cluster-B personality disorder

Note: SITBs: self-injurious thoughts and behaviors.

non-judgmental; responding with a calm, low-key, dispassionate stance; confirming validation; understanding; installing hope; motivating alternatives; respecting for autonomy; containing; mentalizing; performing psychoeducation; and practicing engagement [104]. With regard to the relevance in the assessment of NSSI, the following areas, especially acute suicidality, should be taken into consideration: the form and history (e.g., method, frequency, extent, localization, instruments, co-administrating substance, urge, attempting to give up or not), the physical consequences, context (including neurobiological / emotional / cognitive / familial / social factors), analysis and formulation of functionalities (e.g., predisposing / precipitating / maintaining factors), motivation for treatment, and levels and prioritizing focus of treatment [24, 39, 42, 66, 105-112].

Despite most developed instruments for assessing NSSI being for purposes of research [111], some of them are rather easy and quick to gather systematic information; for instance, the 17 items [113] and the 9 items [114] of the Deliberate Self-Harm Inventory (DSHI), the Self-Injurious Thoughts and Behavior Inventory (SITBI) [115], the Ottawa Self-Injury Inventory (OSI) [116], and the Functional Assessment of Self-Mutilation (FASM) [43].

Management

Surgical treatment

Surgical intervention for wounds from more severe injuries of NSSI can be inevitable. Fortune and colleagues [117] described negative responses of adults toward an adolescent with NSSI can avert potential help-seeking in the future. Accordingly, it is important for different professionals and accountable caretakers to demonstrate integrated care when interacting with the one with NSSI.

Admission to hospital

In adolescents subject to acute suicidality, initiating admission for psychiatric therapy is indicated.

Psychotherapy

A systematic review and meta-analysis demonstrated effectiveness of psychotherapeutic treatments for NSSI in adolescents, including dialectical behavioral therapy for adolescents (DBT-A), cognitive behavioral therapy (CBT), and mentalization-based treatment for adolescents (MBT-A) [118]. Another effective interventions are problem-solving therapy (PST) [119, 120], manual-assisted cognitive therapy (MACT) [121, 122], emotion regulation group therapy (ERGT) [123-127], mobile apps [128, 129], family therapy [130-132]. Witt et al. [133] updated a previous Cochrane Review and concluded further validation of DBT-A and individual CBT-based psychotherapy. There has been no report to conclude about a specific psychological intervention for NSSI superior to others yet [118].

Given the unsatisfactory quality of available evidence of psychosocial interventions in adolescents who engage in NSSI, hypothesis-based practice is neither unreasonable nor contraindicated. Taking “the Four-Function Model” based-practice as an example, the person who performed NSSI would be guided to learn about methods for regulating aversive feelings (automatic-negative reinforcement), or for achieving positive state in different alternatives (automatic-positive reinforcement), or for developing skills to draw boundaries (social-negative reinforcement), or for acquiring skills to achieving similar benefits in a less destructive way (social-positive reinforcement) according to the formulation of functionalities.

Psychopharmacotherapy

Even though some research on psychoactive prescriptions, such as SSRIs, SNRIs, atypical antipsychotics, opioids, and opioid antagonists are assured in NSSI treatment, current evidence of psychchopharmacological therapy for adolescents engaging in NSSI is still inadequate [20, 134, 135]. However, a sedative prescription might be considered when treating an agitated patient during hospitalization [20].

Physical exercise

Wallerstein and Nock [136] found exercise has positive effects of both lifting the mood and reducing the urge to self-injure from a case-study. Jarvi et al. [137] also indicated individuals never engaging in NSSI seem to take exercise more than the ones just performing NSSI. The effectiveness of exercise may result from the release of beta-endorphins which may reduce the urge or need to engage in NSSI [138]. However, further systematical research is needed on the use of physical exercise as a treatment option for NSSI.

Conclusion and Recommendations

NSSI is a frequent maladaptive behavior reported in adolescence, with prevalence rates around 16-18% in community samples worldwide and 60.0% in clinical settings. Despite NSSI may cease in late adolescence or early adulthood, youths with repeated NSSI are susceptible to risk for later mental health issues including suicidality. To date, dozens of studies on NSSI have provided updated information on risk factors (e.g., emotional childhood abuse, bullying, and negative social interaction), neurobiological associations (e.g., HPA-axis alteration, different endogenous opioid responses, and neural processing of emotional stimuli), as well as therapeutic measures (e.g., DBT-A, MBT-A, and CBT). Psychotherapeutic interventions should be advised as the method of choice to alleviate NSSI.

However, much research is fundamental to highlight the need to understand NSSI in adolescence. Firstly, standardized terminology, definition, and conceptualizations of NSSI should be acknowledged to communicate and harmonize the research on prevention, assessment, and intervention of this status. Secondly, the correlational relationship between risk factors and NSSI cannot address causality. Accordingly, it is highly desirable to combine epidemiological and longitudinal research with neurobiological markers in future studies. Thirdly, the problems of effective measures in preventing NSSI and earlier predictors for NSSI course remains unresolved. Therefore, stepped design of both short-termed and long-termed practice-based research, especially including online approaching measures, is required to investigate mechanisms that might underlie NSSI prevalence and severity throughout adolescence and thus to constitute a treatment chain relevant to etiology.

As for practical concerns, there is much room left for notification. At first, albeit with different intentions and functionalities, NSSI and suicidal behaviors may often go hand in hand [22]. These two entities should be put on a continuum of self-harming behaviors, instead of a mutually exclusive dichotomy, to avoid underestimating the risks [139]. In addition, NSSI is both a long-term risk factor and a short-term protective factor of suicide [104, 140, 141]. Therefore, it is very important to obtain prior history of self-harm and suicide, to identify the characteristics of thought and emotion, and to follow up the possibly switching between behaviors with and without suicidal intention to trace the fluctuated suicidality over time. Some comparisons between NSSI and suicidal thoughts and behaviors (STB) are listed in Table 2. Next, there is a risk of stigmatizing

Table 2. Differentiation non-suicidal self-injury (NSSI) from suicidal thoughts and behaviors (STB).

	Non-suicidal self-injury	Suicidal thoughts and behaviors
Prevalence [110, 144-148]	13% - 21%	5% - 9%
Repetitive pattern [149]	frequent	infrequent*
Past incidents [22, 145, 150]		
Community	2-3	1
Inpatients	>100	2.8 - 3.1
Functionalities [149, 151, 152]		
Level of psychological pain	Uncomfortable, intermittent	Unendurable, persistent
stop aversive feelings	Yes	Yes
Repulsion to life	Less	More
Constriction of cognition	Little or no	Extreme constriction
Hopelessness and helplessness	some sense of control	central
Decrease in discomfort following the act	Rapid improvement	No immediate improvement
Core problem	Alienation	Depression, inescapable and unendurable pain
Intent	Relief from unpleasant affect	Termination
Intention to die	No	Yes
Method [145, 149]		
Lethality	Less	More
Variety	Multiple methods	Usually one method of choice
Medical attention needed	Less	More
Restriction of means	Impractical	Important

Note: *Some overdose repeatedly.

adolescents as "mentally ill," [139] even though NSSI can lead to impairment yet without psychiatric disorders and usually ceases in late adolescence [142, 143]. For this reason, psychoeducation for the public regarding NSSI-associated literacy is advisable. Finally, sex difference has received relatively less attention when it comes to NSSI. People may deduce that "girls are more likely to internalize emotional reaction and injure themselves" while "boys are more prone to externalize inner experience and harm others". But this is not always true. Correspondingly, it is paramount to avoid sex stereotypes, especially not focusing on girls only, before assessing risk and implementing interventional measures for NSSI.

References

1. Cooper J, Kapur N, Webb R, et al: Suicide after deliberate self-harm: a 4-year cohort study. Am J Psychiatry 2005;162(2):297-303.
2. International Society for the Study of Self-Injury: What is self-injury? 2022 https://www.itriples.org/what-is-nssi
3. Lloyd-Richardson EE, Perrine N, Dierker L, et al: Characteristics and functions of non-suicidal self-injury in a community sample of adolescents. Psychol Med 2007;37(8):1183-1192.
4. Nock MK: Self-injury. Annu Rev Clin Psychol 2010;6:339-363.
5. American Psychiatric Association: The Diagnostic and Statistical Manual of Mental Disorders, 5th ed. Washington DC, USA: American Psychiatric Association, 2013.
6. World Health Organization: ICD-11 for Mortality and Morbidity Statistics. 2022 https://icd.who.int/browse11/l-m/en
7. Plener PL, Kaess M, Schmahl C, et al: Nonsuicidal self-injury in adolescents. Dtsch Arztebl Int 2018;115(3):23-30.
8. Plener PL, Schumacher TS, Munz LM, et al: The longitudinal course of non-suicidal self-injury and deliberate self-harm: a systematic review of the literature. Borderline Personal Disord Emot Dysregul 2015;2:2.
9. Swannell SV, Martin GE, Page A, et al: Prevalence of nonsuicidal self-injury in nonclinical samples: systematic review, meta-analysis and meta-regression. Suicide Life Threat Behav 2014;44(3):273-303.
10. Cipriano A, Cella S, Cotrufo P: Nonsuicidal self-injury: a systematic review. Front Psychol 2017;8:1946.
11. Zetterqvist M, Lundh LG, Dahlstrom O, et al: Prevalence and function of non-suicidal self-injury (NSSI) in a community sample of adolescents, using suggested DSM-5 criteria for a potential NSSI disorder. J Abnorm Child Psychol 2013;41(5):759-773.
12. Muehlenkamp JJ, Claes L, Havertape L, et al: International prevalence of adolescent non-suicidal self-injury and deliberate self-harm. Child Adolesc Psychiatry Ment Health 2012;6:10.
13. Zetterqvist M: The DSM-5 diagnosis of nonsuicidal self-injury disorder: a review of the empirical literature. Child Adolesc Psychiatry Ment Health 2015;9:31.
14. Manca M, Presaghi F, Cerutti R: Clinical specificity of acute versus chronic self-injury: measurement and evaluation of repetitive non-suicidal self-injury. Psychiatry Res 2014;215(1):111-119.
15. Gillies D, Christou MA, Dixon AC, et al: Prevalence and characteristics of self-harm in adolescents: meta-Analyses of community-based studies 1990-2015. J Am Acad Child Adolesc Psychiatry 2018;57(10):733-741.
16. Kaess M, Parzer P, Mattern M, et al: Adverse childhood experiences and their impact on frequency, severity, and the individual function of nonsuicidal self-injury in youth. Psychiatry Res 2013;206(2-3):265-272.
17. In-Albon T, Ruf C, Schmid M: Proposed diagnostic criteria for the DSM-5 of nonsuicidal self-injury in female adolescents: diagnostic and clinical correlates. Psychiatry J 2013:159-208.
18. Nitkowski D, Petermann F: Non-suicidal self-injury and comorbid mental disorders: a review. Fortschr Neurol Psychiatr 2011;79(1):9-20.
19. Whitlock J, Eckenrode J, Silverman D: Self-injurious behaviors in a college population. Pediatrics 2006;117(6):1939-1948.
20. Brown RC, Plener PL: Non-suicidal self-injury in adolescence. Curr Psychiatry Rep 2017;19(3):20.
21. Nakar O, Brunner R, Schilling O, et al: Developmental trajectories of self-injurious behavior, suicidal behavior and substance misuse and their association with adolescent borderline personality pathology. J Affect Disord 2016;197:231-238.
22. Groschwitz RC, Kaess M, Fischer G, et al: The association of non-suicidal self-injury and suicidal behavior according to DSM-5 in adolescent psychiatric inpatients. Psychiatry Res 2015;228(3):454-461.
23. Hawton K, Bergen H, Cooper J, et al: Suicide following self-harm: findings from the Multicentre Study of self-harm in England, 2000-2012. J Affect Disord 2015;175:147-151.
24. Andover MS, Morris BW, Wren A, et al: The co-occurrence of non-suicidal self-injury and attempted suicide among adolescents: distinguishing risk factors and psychosocial correlates. Child Adolesc Psychiatry Ment Health 2012;6:11.
25. Chesin MS, Galfavy H, Sonmez CC, et al: Nonsuicidal self-injury is predictive of suicide attempts among individuals with mood disorders. Suicide Life Threat Behav 2017;47(5):567-579.
26. Carroll R, Thomas KH, Bramley K, et al: Self-cutting and risk of subsequent suicide. J Affect Disord 2016;192:8-10.
27. Fox KR, Franklin JC, Ribeiro JD, et al: Meta-analysis of risk factors for nonsuicidal self-injury. Clin Psychol Rev 2015;42:156-167.
28. De Luca L, Giletta M, Nocentini A, et al: Non-suicidal self-injury in adolescence: the role of pre-existing vulnerabilities and COVID-19-related stress. J Youth Adolesc 2022;51(12):2383-2395.
29. Bresin K, Schoenleber M: Gender differences in the prevalence of nonsuicidal self-injury: a meta-analysis. Clin Psychol Rev 2015;38:55-64.
30. Monto MA, McRee N, Deryck FS: Nonsuicidal

self-injury among a representative sample of US adolescents, 2015. Am J Public Health 2018;108(8):1042-1048.
31. Gratz KL, Conrad SD, Roemer L: Risk factors for deliberate self-harm among college students. Am J Orthopsychiatry 2002;72(1):128-140.
32. Hilt LM, Cha CB, Nolen-Hoeksema S: Nonsuicidal self-injury in young adolescent girls: moderators of the distress-function relationship. J Consult Clin Psychol 2008;76(1):63-71.
33. Møhl B, Skandsen A: The prevalence and distribution of self-harm among Danish high school students. Pers Ment Health 2012;6(2):147-155.
34. Andover MS, Primack JM, Gibb BE, et al: An examination of non-suicidal self-injury in men: do men differ from women in basic NSSI characteristics? Arch Suicide Res 2010;14(1):79-88.
35. Møhl B: Epidemiology and gender differences. In: Assessment and Treatment of Non-Suicidal Self-Injury: A Clinical Perspective. London and New York: Routledge, 2019; 24-33.
36. Brunner R, Kaess M, Parzer P, et al: Life-time prevalence and psychosocial correlates of adolescent direct self-injurious behavior: a comparative study of findings in 11 European countries. J Child Psychol Psychiatry 2014;55(4):337-348.
37. Claes L, Vandereycken W, Vertommen H: Self-injury in female versus male psychiatric patients: a comparison of characteristics, psychopathology and aggression regulation. Pers Individ Differ 2007;42(4):611-621.
38. Forrester RL, Slater H, Jomar K, et al: Self-esteem and non-suicidal self-injury in adulthood: a systematic review. J Affect Disord 2017;221:172-183.
39. Klonsky ED: The functions of self-injury in young adults who cut themselves: clarifying the evidence for affect-regulation. Psychiatry Res 2009;166(2-3):260-268.
40. Daigle M, Lafontaine M, Levesque C, et al: The relationship between perfectionism and non-suicidal elf-injury in a student sample of young adults. JIRIRI 2018;11:53-64.
41. Møhl B: From Meaning to Function, in Assessment and Treatment of Non-Suicidal Self-Injury: A Clinical Perspective. London and New York: Routledge, 2019; 90-101.
42. Klonsky ED: The functions of deliberate self-injury: a review of the evidence. Clin Psychol Rev 2007;27(2):226-239.
43. Nock MK, Prinstein MJ: A functional approach to the assessment of self-mutilative behavior. J Consult Clin Psychol 2004;72(5):885-890.
44. Taylor PJ, Jomar K, Dhingra K, et al: A meta-analysis of the prevalence of different functions of non-suicidal self-injury. J Affect Disord 2018;227:759-769.
45. Bentley KH, Nock MK, Barlow DH: The four-function model of nonsuicidal self-injury: key directions for future research. Clin Psychol Sci 2014;2(5):638-656.
46. Hepp J, Carpenter RW, Störkel LM, et al: A systematic review of daily life studies on non-suicidal self-injury based on the four-function model. Clin Psychol Rev 2020;82:101888.
47. Yates TM, Carlson EA, Egeland B: A prospective study of child maltreatment and self-injurious behavior in a community sample. Dev Psychopathol 2008;20(2):651-671.
48. Muehlenkamp JJ, Kerr PL, Bradley AR, et al: Abuse subtypes and nonsuicidal self-injury: preliminary evidence of complex emotion regulation patterns. J Nerv Ment Dis 2010;198(4):258-263.
49. Swannell S, Martin G, Page A, et al: Child maltreatment, subsequent non-suicidal self-injury and the mediating roles of dissociation, alexithymia and self-blame. Child Abuse Negl 2012;36(7-8):572-584.
50. Tschan T, Schmid M, In-Albon T: Parenting behavior in families of female adolescents with nonsuicidal self-injury in comparison to a clinical and a nonclinical control group. Child Adolesc Psychiatry Ment Health 2015;9:17.
51. Thomassin K, Shaffer A, Madden A, et al: Specificity of childhood maltreatment and emotion deficit in nonsuicidal self-injury in an inpatient sample of youth. Psychiatry Res 2016;244:103-108.
52. Brown RC, Heines S, Witt A, et al: The impact of child maltreatment on non-suicidal self-injury: data from a representative sample of the general population. BMC Psychiatry 2018;18(1):181.
53. Klonsky ED, Moyer A: Childhood sexual abuse and non-suicidal self-injury: meta-analysis. Br J Psychiatry 2008;192(3):166-170.
54. Maniglio R: The role of child sexual abuse in the etiology of suicide and non-suicidal self-injury. Acta Psychiatr Scand 2011;124(1):30-41.
55. Noll JG, Horowitz LA, Bonanno GA, et al: Revictimization and self-harm in females who experienced childhood sexual abuse: results from a prospective study. J Interpers Violence 2003;18(12):1452-1471.
56. Gromatsky MA, Waszczuk MA, Perlman G, et al: The role of parental psychopathology and personality in adolescent non-suicidal self-injury. J Psychiatr Res 2017;85:15-23.
57. Smith NB, Kouros CD, Meuret AE: The role of trauma symptoms in nonsuicidal self-injury. TVA 2014;15(1):41-56.
58. Yates TM: Developmental pathways from child maltreatment to nonsuicidal self-injury. In: Understanding Non-Suicidal Self-Injury: Origins, Assessment, and Treatment, M.K. Nock, Ed. Washington, DC: American Psychological Association, 2009; 117-137.
59. Hankin BL, Abela JR: Nonsuicidal self-injury in adolescence: prospective rates and risk factors in a 2½ year longitudinal study. Psychiatry Res 2011;186(1):65-70.
60. Lereya ST, Copeland WE, Costello EJ, et al: Adult mental health consequences of peer bullying and maltreatment in childhood: two cohorts in two countries. Lancet Psychiatry 2015;2(6):524-531.
61. Brunstein Klomek A, Snir A, Apter A, et al: Association between victimization by bullying and direct self injurious behavior among adolescence in Europe: a ten-country study. Eur Child Adolesc Psychiatry 2016;25(11):1183-1193.
62. Jarvi S, Jackson B, Swenson L, et al: The impact of social contagion on non-suicidal self-injury: a review

of the literature. Arch Suicide Res 2013;17(1):1-19.
63. Lewis SP, Mahdy JC, Michal NJ, et al: Googling self-injury: the state of health information obtained through online searches for self-injury. JAMA Pediatr 2014;168(5):443-449.
64. Lewis SP, Heath NL, St Denis JM, et al: The scope of nonsuicidal self-injury on YouTube. Pediatrics 2011;127(3):e552-557.
65. Nesi J, Burke TA, Bettis AH, et al: Social media use and self-injurious thoughts and behaviors: a systematic review and meta-analysis. Clin Psychol Rev 2021;87:102038.
66. Young R, Sproeber N, Groschwitz RC, et al: Why alternative teenagers self-harm: exploring the link between non-suicidal self-injury, attempted suicide and adolescent identity. BMC Psychiatry 2014;14:137.
67. Bowes L, Carnegie R, Pearson R, et al: Risk of depression and self-harm in teenagers identifying with goth subculture: a longitudinal cohort study. Lancet Psychiatry 2015;2(9):793-800.
68. Wilcox HC, Arria AM, Caldeira KM, et al: Longitudinal predictors of past-year non-suicidal self-injury and motives among college students. Psychol Med 2012;42(4):717-726.
69. Fraser G, Wilson MS, Garisch JA, et al: Non-suicidal self-injury, sexuality concerns, and emotion regulation among sexually diverse adolescents: a multiple mediation analysis. Arch Suicide Res 2018;22(3):432-452.
70. Marshall E, Claes L, Bouman WP, et al: Non-suicidal self-injury and suicidality in trans people: a systematic review of the literature. Int Rev Psychiatry 2016;28(1):58-69.
71. Casey BJ, Jones RM, Hare TA: The adolescent brain. Ann N Y Acad Sci 2008;1124:111-126.
72. Vijayakumar N, Op de Macks Z, Shirtcliff EA, et al: Puberty and the human brain: insights into adolescent development. Neurosci Biobehav Rev 2018;92:417-436.
73. Ludäscher P, Greffrath W, Schmahl C, et al: A cross-sectional investigation of discontinuation of self-injury and normalizing pain perception in patients with borderline personality disorder. Acta Psychiatr Scand 2009;120(1):62-70.
74. Schmahl C, Bohus M, Esposito F, et al: Neural correlates of antinociception in borderline personality disorder. Arch Gen Psychiatry 2006;63(6):659-667.
75. Reitz S, Kluetsch R, Niedtfeld I, et al: Incision and stress regulation in borderline personality disorder: neurobiological mechanisms of self-injurious behaviour. Br J Psychiatry 2015;207(2):165-172.
76. Reichl C, Heyer A, Brunner R, et al: Hypothalamic-pituitary-adrenal axis, childhood adversity and adolescent nonsuicidal self-injury. Psychoneuroendocrinology 2016;74:203-211.
77. Beauchaine TP, Crowell SE, Hsiao RC: Post-dexamethasone cortisol, self-inflicted injury, and suicidal ideation among depressed adolescent girls. J Abnorm Child Psychol 2015;43(4):619-632.
78. Osuch E, Ford K, Wrath A, et al: Functional MRI of pain application in youth who engaged in repetitive non-suicidal self-injury vs. psychiatric controls. Psychiatry Res 2014;223(2):104-112.
79. Kaess M, Hille M, Parzer P, et al: Alterations in the neuroendocrinological stress response to acute psychosocial stress in adolescents engaging in nonsuicidal self-injury. Psychoneuroendocrinology 2012;37(1):157-161.
80. Møhl B: Pathophysiology and neurobiological perspectives on self-injury. In: Assessment and Treatment of Non-Suicidal Self-Injury: A Clinical Perspective. London ane New York: Routledge, 2019; 102-109.
81. Hankin BL, Barrocas AL, Young JF, et al: 5-HTTLPR × interpersonal stress interaction and nonsuicidal self-injury in general community sample of youth. Psychiatry Res 2015;225(3):609-612.
82. Turner CA, Lewis MH: Dopaminergic mechanisms in self-injurious behavior and related disorders. In: Self-Injurious Behavior: Genes-Brain-Behavior Relationships, S.R. Schroeder, M.L.E. Oster-Granite, and T.E. Thompson, Ed. Washington, DC: American Psychological Association, 2002; 165-179.
83. Blasco-Fontecilla H, Fernández-Fernández R, Colino L, et al: The addictive model of self-harming (Non-suicidal and suicidal) behavior. Front Psychiatry 2016;7:8.
84. Ludäscher P, von Kalckreuth C, Parzer P, et al: Pain perception in female adolescents with borderline personality disorder. Eur Child Adolesc Psychiatry 2015;24(3):351-357.
85. Koenig J, Rinnewitz L, Warth M, et al: Psychobiological response to pain in female adolescents with nonsuicidal self-injury. J Psychiatry Neurosci 2017;42(3):189-199.
86. Stanley B, Sher L, Wilson S, et al: Non-suicidal self-injurious behavior, endogenous opioids and monoamine neurotransmitters. J Affect Disord 2010;124(1-2):134-140.
87. Nixon MK, Cloutier PF, Aggarwal S: Affect regulation and addictive aspects of repetitive self-injury in hospitalized adolescents. J Am Acad Child Adolesc Psychiatry 2002;41(11):1333-1341.
88. Franklin JC, Lee KM, Hanna EK, et al: Feeling worse to feel better: pain-offset relief simultaneously stimulates positive affect and reduces negative affect. Psychol Sci 2013;24(4):521-529.
89. Yates TM: The developmental psychopathology of self-injurious behavior: compensatory regulation in posttraumatic adaptation. Clin Psychol Rev 2004;24(1):35-74.
90. Plener PL, Bubalo N, Fladung AK, et al: Prone to excitement: adolescent females with non-suicidal self-injury (NSSI) show altered cortical pattern to emotional and NSS-related material. Psychiatry Res 2012;203(2-3):146-152.
91. Groschwitz RC, Plener PL, Groen G, et al: Differential neural processing of social exclusion in adolescents with non-suicidal self-injury: an fMRI study. Psychiatry Res Neuroimaging 2016;255:43-49.
92. LeDoux J: The Emotional Brain: The Mysterious Underpinnings of Emotional Life. New York: Simon and Schuster, 1998.
93. Chang SS, Chen YY, Heron J, et al: IQ and adolescent self-harm behaviours in the ALSPAC birth cohort. J Affect Disord 2014;152-154:175-182.
94. Mürner-Lavanchy I, Koenig J, Lerch S, et al:

Neurocognitive functioning in adolescents with non-suicidal self-injury. J Affect Disord 2022;311:55-62.
95. Hawton K, Saunders K, Topiwala A, et al: Psychiatric disorders in patients presenting to hospital following self-harm: a systematic review. J Affect Disord 2013;151(3):821-830.
96. Nitkowski D, Petermann F: Selbstverletzendes Verhalten und komorbide psychische Störungen: ein Überblick. Fortschritte der Neurologie· Psychiatrie 2011;79(01):9-20.
97. Wilkinson PO, Qiu T, Neufeld S, et al: Sporadic and recurrent non-suicidal self-injury before age 14 and incident onset of psychiatric disorders by 17 years: prospective cohort study. Br J Psychiatry 2018;212(4):222-226.
98. Møhl B: Historical theories and new models for understanding non-suicidal self-injury. In: Assessment and Treatment of Non-Suicidal Self-Injury: A Clinical Perspective. London and New York: Routledge, 2019; 47-64.
99. Rotolone C, Martin G: Giving up self-injury: a comparison of everyday social and personal resources in past versus current self-injurers. Arch Suicide Res 2012;16(2):147-158.
100. Claes L, Luyckx K, Baetens I, et al: Bullying and victimization, depressive mood, and non-suicidal self-injury in adolescents: the moderating role of parental support. J Child Fam Stud 2015;24(11):3363-3371.
101. Christoffersen MN, Møhl B, DePanfilis D, et al: Non-suicidal self-injury--does social support make a difference? an epidemiological investigation of a Danish national sample. Child Abuse Negl 2015;44:106-116.
102. Frost M, Casey L: Who seeks help online for self-injury? Arch Suicide Res 2016;20(1):69-79.
103. Lewis SP, Seko Y: A double-edged sword: a review of benefits and risks of online nonsuicidal self-injury sctivities. J Clin Psychol 2016;72(3):249-262.
104. Møhl B: Assessment of patinets with non-suicidal self-injury. In: Assessment and Treatment of Non-Suicidal Self-Injury: A Clinical Perspective. London and New York: Routledge, 2019; 110-128.
105. Wester KL, Ivers N, Villalba JA, et al: The relationship between nonsuicidal self-injury and suicidal ideation. J Couns Dev 2016;94(1):3-12.
106. Zetterqvist M, Svedin CG, Fredlund C, et al: Self-reported nonsuicidal self-injury (NSSI) and sex as self-injury (SASI): relationship to abuse, risk behaviors, trauma symptoms, self-esteem and attachment. Psychiatry Res 2018;265:309-316.
107. Klonsky ED, Glenn CR: Resisting urges to self-injure. Behav Cogn Psychother 2008;36(2):211-220.
108. Brown RC, Fischer T, Goldwich AD, et al: #cutting: non-suicidal self-injury (NSSI) on instagram. Psychol Med 2018;48(2):337-346.
109. Mahtani S, Melvin GA, Hasking P: Shame proneness, shame coping, and functions of nonsuicidal self-injury (NSSI) among emerging adults: a developmental analysis. Emerg Adulthood 2018;6(3):159-171.
110. Nock MK, Kessler RC: Prevalence of and risk factors for suicide attempts versus suicide gestures: analysis of the national comorbidity survey. J Abnorm Psychol 2006;115(3):616-623.
111. Klonsky ED, Lewis SP: Assessment of non-suicidal self-injury. In: The Oxford Handbook of Suicide and Self-Injury, M.K. Nock, Ed. Oxford, England: Oxford University Press, 2014; 337-354.
112. Klonsky ED: Non-suicidal self-injury in United States adults: prevalence, sociodemographics, topography and functions. Psychol Med 2011;41(9):1981-1986.
113. Gratz KL: Measurement of deliberate self-harm: preliminary data on the Deliberate Self-Harm Inventory. J Psychopathol Behav Assess 2001;23(4):253-263.
114. Lundh LG, Karim J, Quilisch E: Deliberate self-harm in 15-year-old adolescents: a pilot study with a modified version of the Deliberate Self-Harm Inventory. Scand. J. Psychol 2007;48(1):33-41.
115. Nock MK, Holmberg EB, Photos VI, et al: Self-injurious thoughts and behaviors interview: development, reliability, and validity in an adolescent sample. Psychol Assess 2007;19(3):309-317.
116. Nixon MK, Levesque C, Preyde M, et al: The Ottawa Self-Injury Inventory: evaluation of an assessment measure of nonsuicidal self-injury in an inpatient sample of adolescents. Child Adolesc Psychiatry Ment Health 2015;9:26.
117. Fortune S, Sinclair J, Hawton K: Help-seeking before and after episodes of self-harm: a descriptive study in school pupils in England. BMC Public Health 2008;8:369.
118. Ougrin D, Tranah T, Stahl D, et al: Therapeutic interventions for suicide attempts and self-harm in adolescents: systematic review and meta-analysis. J Am Acad Child Adolesc Psychiatry 2015;54(2):97-107.e102.
119. Hawton K, Arensman E, Townsend E, et al: Deliberate self harm: systematic review of efficacy of psychosocial and pharmacological treatments in preventing repetition. BMJ 1998;317(7156):441-447.
120. Nock MK: Actions speak louder than words: an elaborated theoretical model of the social functions of self-injury and other harmful behaviors. Appl Prev Psychol 2008;12(4):159-168.
121. Evans K, Tyrer P, Catalan J, et al: Manual-assisted cognitive-behaviour therapy (MACT): a randomized controlled trial of a brief intervention with bibliotherapy in the treatment of recurrent deliberate self-harm. Psychol Med 1999;29(1):19-25.
122. Weinberg I, Gunderson JG, Hennen J, et al: Manual assisted cognitive treatment for deliberate self-harm in borderline personality disorder patients. J Pers Disord 2006;20(5):482-492.
123. Gratz KL: Targeting emotion dysregulation in the treatment of self-injury. J Clin Psychol 2007;63(11):1091-1103.
124. Gratz KL, Gunderson JG: Preliminary data on an acceptance-based emotion regulation group intervention for deliberate self-harm among women with borderline personality disorder. Behav Ther 2006;37(1):25-35.
125. Gratz KL, Tull MT: Extending research on the utility of an adjunctive emotion regulation group therapy for deliberate self-harm among women with borderline personality pathology. Personal Disord

2011;2(4):316-326.
126. Sahlin H, Bjureberg J, Gratz KL, et al: Emotion regulation group therapy for deliberate self-harm: a multi-site evaluation in routine care using an uncontrolled open trial design. BMJ Open 2017;7(10):e016220.
127. Bjureberg J, Sahlin H, Hedman-Lagerlöf E, et al: Extending research on Emotion Regulation Individual Therapy for Adolescents (ERITA) with nonsuicidal self-injury disorder: open pilot trial and mediation analysis of a novel online version. BMC Psychiatry 2018;18(1):326.
128. Franklin JC, Fox KR, Franklin CR, et al: A brief mobile app reduces nonsuicidal and suicidal self-injury: evidence from three randomized controlled trials. J Consult Clin Psychol 2016;84(6):544-557.
129. Grist R, Porter J, Stallard P: Acceptability, se, and Sasfety of a mobile phone app (BlueIce) for young people who self-harm: qualitative study of service users' experience. JMIR Ment Health 2018;5(1):e16.
130. Waals L, Baetens I, Rober P, et al: The NSSI family distress cascade theory. Child Adolesc Psychiatry Ment Health 2018;12:52.
131. Arbuthnott AE, Lewis SP: Parents of youth who self-injure: a review of the literature and implications for mental health professionals. Child Adolesc Psychiatry Ment Health 2015;9:35.
132. Aggarwal S, Patton G: Engaging families in the management of adolescent self-harm. Evid Based Ment Health 2018;21(1):16-22.
133. Witt KG, Hetrick SE, Rajaram G, et al: Interventions for self-harm in children and adolescents. Cochrane Database Syst Rev 2021;3(3):Cd013667.
134. Hawton K, Witt KG, Salisbury TLT, et al: Pharmacological interventions for self-harm in adults. CDSR 2015(7).
135. Turner BJ, Austin SB, Chapman AL: Treating nonsuicidal self-injury: a systematic review of psychological and pharmacological interventions. Can J Psychiatry 2014;59(11):576-585.
136. Wallenstein MB,Nock MK: Physical exercise as a treatment for non-suicidal self-injury: evidence from a single-case study. Am J Psychiatry 2007;164(2):350-351.
137. Jarvi SM, Hearon BA, Batejan KL, et al: Relations between past-week physical activity and recent nonsuicidal self-injury in treatment-seeking psychiatric adults. J Clin Psychol 2017;73(4):479-488.
138. Bresin K, Gordon KH: Endogenous opioids and nonsuicidal self-injury: a mechanism of affect regulation. Neurosci Biobehav Rev 2013;37(3):374-383.
139. Kapur N, Cooper J, O'Connor RC, et al: Non-suicidal self-injury v. attempted suicide: new diagnosis or false dichotomy? Br J Psychiatry 2013;202(5):326-328.
140. Griep SK, MacKinnon DF: Does nonsuicidal self-injury predict later suicidal attempts? a review of studies. Arch Suicide Res 2022;26(2):428-446.
141. Kiekens G, Hasking P, Boyes M, et al: The associations between non-suicidal self-injury and first onset suicidal thoughts and behaviors. J Affect Disord 2018;239:171-179.
142. Andover MS: Non-suicidal self-injury disorder in a community sample of adults. Psychiatry Res 2014;219(2):305-310.
143. Jacobson CM, Gould M: The epidemiology and phenomenology of non-suicidal self-injurious behavior among adolescents: a critical review of the literature. Arch Suicide Res 2007;11(2):129-147.
144. Mars B, Heron J, Crane C, et al: Differences in risk factors for self-harm with and without suicidal intent: findings from the ALSPAC cohort. J Affect Disord 2014;168:407-414.
145. Muehlenkamp JJ, Gutierrez PM: Risk for suicide attempts among adolescents who engage in non-suicidal self-injury. Arch Suicide Res 2007;11(1):69-82.
146. Baetens I, Claes L, Muehlenkamp J, et al: Non-suicidal and suicidal self-injurious behavior among Flemish adolescents: a web-survey. Arch Suicide Res 2011;15(1):56-67.
147. Brausch AM, Gutierrez PM: The role of body image and disordered eating as risk factors for depression and suicidal ideation in adolescents. Suicide Life Threat Behav 2009;39(1):58-71.
148. Ross S , Heath N: A study of the frequency of self-mutilation in a community sample of adolescents. J Youth Adolesc 2002;31(1):67-77.
149. Walsh BW: Definition and differentiation from suicide. In: Treating Self-Injury: A Practical Guide, B.W. Walsh, Ed. New York: Guilford Press, 2012; 3-19.
150. Nock MK, Joiner TE, Jr., Gordon KH, et al: Non-suicidal self-injury among adolescents: diagnostic correlates and relation to suicide attempts. Psychiatry Res 2006;144(1):65-72.
151. Tapola V, Wahlström J, Kuittinen M, et al: The co-occurrence of nonsuicidal and suicidal self-injurious acts in adult women: a pilot study of similarities and differences. Nord Psychol 2015;67(1):27-45.
152. Muehlenkamp JJ, Gutierrez PM: An investigation of differences between self-injurious behavior and suicide attempts in a sample of adolescents. Suicide Life Threat Behav 2004;34(1):12-23.

Review Articles

Grief and Coping of the Owner Toward Pet Loss

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Abstract: The human-pet relationship is unique because pets give their owners unconditional love and companionship. Thus, pet loss may inflict a significant emotional impact upon the companion animal owner and result in a complicated grief response. This review aimed to examine the relationship between pet loss and owner's grief response. Major themes included: stages of grief, maladaptive grief, factors that influence the grief response, disenfranchised grief, and coping mechanisms used. Types of coping mechanisms used by owners toward pet loss included: isolation, social support, continuing bonds, memorialization, religion, and relationships with other animals. Grief interventions, coping mechanisms, and cognitive behavioral programs may be helpful for some vulnerable pet owners who have high levels of suicidal ideation and depressed feelings over bereavement. Suggestions for further research include the cultural differences in the conceptualization of disenfranchised grief and a focus on the effectiveness of coping mechanisms that bereaved pet owners use.

Keywords: pet loss, pet bereavement, grief response, coping mechanism, disenfranchised grief.

(Journal of Suicidology 2022; 17(4): 319-324. DOI:10.30126/JoS.202212_17(4).0011)

Introduction

Taiwan Pet Introduction and distribution

According to the latest statistics from the Ministry of the Interior, in the first nine months of 2022, more than 170,000 new pets have been registered in Taiwan, yet only about 140,000 newborns are estimated[1]. In Taiwan, pets grow much faster than newborns. According to the Ministry of the Interior and the Council of Agriculture, in 2021, the number of pet dogs and cats in Taiwan have outreach the young population first time in history, estimated of 2.95 million of pets compared with 2.89 million of the young population aged 0-14 years old[2].

The Pet Registration Information System of The Council of Agriculture reported that 1,390,285 dogs and 792,297 cats were registered in October, 2022[3]. The cities that follow the largest registration were Taipei, Taichung, and Kaohsiung city which are also the most populated cities[3]. According to the pet consumption behavior survey conducted by the Industrial Intelligence Research Institute in 2021, 60% of pet owners in Taiwan own dogs, and 30% own cats. In addition, female owners are 1.7 times more than male owners[2].

Pet expands and its market

According to ASPCA pet insurance, cat owners are expected to spend roughly 634 USD annually, or 53 USD per month on their pet[4]. According to the pet consumption behavior survey conducted by the Taiwan Industrial Intelligence Research Institute in 2021, the annual expenditure is about 60,000 NTD, or 5,000 NTD per month[1]. Analysis of pet-related tax industry sales in Taiwan reported that from 2018 to 2020, total pet sales have been increasing every year, from 34.62 billion NTD to 39.53 billion NTD in three years. The imported cat and dog food have grown by 116 million USD in the past 13 years[2].

Benefit of getting a pet

Pets are the most loyal friends of human beings and pet ownership may be one of the greatest joys of life. For many owners, their pets are their best friends and family members [5, 6]. Pet provides owners with unconditional love and companionship, and help owners manage loneliness and sometimes depression [5-11]. They can increase the opportunities to exercise and socialize [7, 9-11]. Regular playing or walking with pets can decrease blood pressure, and cholesterol, and also is beneficial to mental health [5, 11-13]. There is no question that there is a strong emotional tie between the pet and its owner taking care of it [5, 6].

However, the lifespan for most pets is not as long as human beings [4, 14-17]. The average lifespan of a common pet is several decades. According to PETMD and Petozy, the average life span of a dog is between 10 to 13 years[14, 15]. On the other hand, the average life span of cats is about 12 to 15 years[4, 16]. The life expectancy of pets depends on many factors, including health, diet, breed types, and environment [11, 17, 18]. As animals tend to have shorter lifespans, owners may experience multiple bereavements of animal companions during their lifetime [19].

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Received: 12 December 2022; **Accepted:** 16 December 2022.

The death of pet can hurt as much as the loss of a relatives or sometimes even more

The death of a pet can hurt as much as the loss of a relative." The Washington Post published an article in 2012 which will resonate with any person who has lost a special pet [20]. Two review articles indicated that animal owners who experience the death of a beloved family pet or companion animal may experience a grief response similar to that of a human death [21, 22]. Studies comparing grief over the death of pets to that over the death of friends and family members found that the death of a companion animal can be just as devastating as the loss of a human significant other, far more intense, or just about the same [23, 24].The human-pet relationship is unique, as pet owners often derive unconditional love and acceptance without judgment from their companion animal [25]. It comes up to the explanation that the difference between a pet and a family member is that pet gave the owner constant companionship, and the pet was total dependency. Pet owners started to realize that is why they are grieving so intensely [20].

Human-pet relationship

The human-pet relationship is unique, as pets give unconditional love and companionship to their owners. Pets nowadays are viewed as family members. Pets improve the health of their owners and families, giving emotionally and physical benefits by offering companionship while working, playing, traveling, and sometime exercising with their owners [7, 9, 10, 26]. Human-pet bonds may be as strong as relationships between humans [27, 28]. This review aimed to examine the relationship between pet loss and owner's grief response.

The Stages of Grief

The stages of grief that come to pet loss often are similar to the bereavement of family or friends' death [21, 29, 30]. Grieving and bereaved pet owners frequently go through stages of shock, denial, anger, bargaining, guilt and loneliness, depression and anxiety, testing and acceptance [29, 31]. There is more to grief than other people realize. Pet owners could experience the whole force of grief. Pet owners could mourn over the loss of sentimental objects, the loss of a beloved place, or any kind of relationship or connection [32]. Whenever something is lost, no matter what, no matter why, the loss causes pain and that is grief. Weakness and vulnerability are a part of the grieving process.

The guilt phase is often part of a pet owner's experience of grief [33-35]. Some feel left behind, some feel survivor's guilt, and some believe they should also be gone or die with their pets [33, 35, 36]. Facing death often requires confronting and re-evaluating the pet owners' life and the bond between them [27, 28, 36, 37]. Some owners regret what they had missed out on before the death of their pet. They may regret something that they did or did not do. During the grief process, some pet owners may experience guilt phases, thinking that it is their fault that their pet had passed away but this usually is not the case. Often owners may feel that they should have done something to make their pet better. Healing needs outside assistance or internal reflection when these pet owners experience major depression and anxiety, and treatment from medical health professionals is essential [5, 8, 28, 34, 38, 39].

Acceptance is more complicated than just admitting to a loss. Acceptance is not a finish line. The grieving process may not have a real finish line [22, 24]. Pet owners may experience several cycles of grief throughout their life or some may regress in the intensity of uncomplicated grief. Pet owners must accept the cycle of grief and focus on the coping mechanism used to manage pet loss [24, 36, 40].

Maladaptive Grief

Maladaptive grief may present as excessive anger [41]. Suicidal ideation can also be complicated by feelings of guilt, shame, and rejection [42]. Therefore, pet owners bereaved by complicated grief are related to negative physical and mental health and may increase the risk for suicidal behavior [24, 38]. Prior studies revealed that the percentage of bereaved pet owners experiencing major pathological disruption is relatively low (<5%–12%) [43]. Subclinical levels of grief and sadness are relatively common human responses to the death of companion pets/animals and last 6 months or more for about 30% of those sampled [43]. Further study found that 3.8% of bereaved pet owners met the cutoff score for complicated grief and 5.7% met the cutoff score for post-traumatic stress disorder following the death of a pet/animal [44]. Greif interventions, coping mechanisms, and cognitive behavioral programs were helpful for these vulnerable pet owners who have high levels of suicidal ideation and depressed feelings over bereavement [22, 40, 45-47].

Factors Influencing the Grief Responses

Factors influencing the grief responses include owner characteristics (e.g., gender, life stage, and prior experiences), pet characteristics, and attachment level to the companion animal.(Table 1) Studies indicated females form a stronger bond with their pets and so do experience grief more intensely than males [48, 49]. Certain life stages are more venerable to complicated grief responses, particularly adolescents with limited death-related experience or elderly who have suffered subsequent losses[30, 50]. However, the study suggested that pet owners who experienced pet bereavement during childhood or adolescence tend to have a higher level of emotion regulation [51]. The effect of age on grief response remains controversial [52].

Furthermore, the intensity of grief seemed to be affected by factors like the strength of the human–animal bond, lack of perceived social support, lack of empathy from close ones, being married without children, and euthanasia decision [25, 53]. The studies showed that human-pet bond can intensify the grieving process by focusing on negative bonds, leading to severe grief and

Table 1. Factors influencing the grief response.

Owner characteristics
Gender: female
Life stage: adolescents, elderly
Prior experiences
Attachment level
Lack of perceived social support
Human-pet bond: strong
Pet characteristics
Sudden death of pet
Long-term illness of pets: cancer
Decision making of euthanasia
Veterinary staffs' aid

correlated with a problematic emotional response (e.g. depression, anxiety, and guilt) [53, 54]. Pet owners who held strong attachments experienced greater grief compared to individuals who were less attached to their pets [35, 53, 55]. However, identifying appropriate human-pet bonds can be useful to moderate the intensity of grief and be a valuable mechanism of support [27].

Sudden death was related to feelings of anger and guilt while owners who euthanized their pet due to long-term illness (e.g., cancer) demonstrate an adaptive grief response associated with lower levels of anger and guilt [35].

Disenfranchised Grief

In western cultures, the word disenfranchised has been linked with grief to describe the pet bereavement experience [28]. Disenfranchised grief is the grief that people experience when they incur a loss that is not acknowledged or supported. Disenfranchised grief can complicate the bereavement process and deepen or prolong negative emotional reactions [39]. Characteristics of disenfranchisement such as social constraints, invalidation and a failure to understand the meaning of loss, prohibition of the expression of grief, sense of isolation, and separation from important social relationships have been associated with negative mental and physical health consequences [21, 28, 38, 39]. A study indicated that bereaved pet owners in Hawaii who were unable to grieve were more likely to experience higher levels of anxiety, depression, and grief severity, and had more difficulty resolving their grief [44]. However, this form of bereavement has not been explored in Chinese societies. A case study in Hong Kong suggested that the pet bereavement was distressful for many participants and many of them gradually achieved personal growth from their loss experience [25]. But the issue of disenfranchised grief was not discussed.

Pet Bereavement and Coping Mechanisms

A national survey study of companion animal owners demonstrated the methods of coping following euthanasia were: 74.7% mourned privately, 58.2% sought social support, 32.1% adopted a new companion animal, 12.4% relied on faith or prayer, and 0.9% participated in a support group [56]. Five subthemes of coping mechanisms were identified in a literature review of pet bereavement: isolation, social support, continuing bonds and memorialization, religion and spirituality, and relationships with other animals [21]. (Table 2)

Table 2. Factors influencing the grief response.

Isolation, social support,
Social support
Continuing bonds and memorialization
Religion and spirituality
Relationships with other animals

Bereaved pet owners commonly choose to mourn their loss privately and the disenfranchised nature of pet grief results in a sense of isolation and separation from important social relationships [38, 56, 57]. People experiencing pet bereavement may tend to avoid others and feel incapable of reaching out for social support [25]. In the context of pet bereavement, self-compassion associated with greater engagement in self-soothing coping efforts may buffer social constraints and psychosocial outcomes, most notably depression[39].

Pet bereavement may be exacerbated in the absence of other supports, and post-traumatic growth may be more likely to occur in the presence of high levels of support from family, friends, or counselors [25]. Social support is essential to prevent the development of a complicated grief response [54] and may help facilitate improved quality of life [58] and positive growth following pet loss [25, 59, 60]. Pet loss can be associated with growth and finding meaning in the experience if appropriate social supports and coping mechanisms are in place. Greater attachment and greater grief regarding deceased pets predicted growth in the presence of greater perceived social supports [61]. Recognizing the deep relationship between grief and the loss of a companion animal, veterinarians and mental health practitioners often find themselves consoling pet owners both prior to and in the aftermath of pet euthanasia [62]. Methods veterinarians may use to provide their support for the pet owner include engaging in active listening to the owners' feelings, reassuring the owner of their decision, or offering a comforting touch [63]. Receiving support (e.g., card, memento, phone call) from veterinary staff following a pet's death may aid in the bereavement process[62, 63]. Mental health practitioners such as grief counseling, local support groups, or the number of a pet loss hotline service can offer psychological support to assist in the bereavement process associated with euthanasia and pet loss [24, 49]. Vulnerable bereaved pet owners (e.g., ambiguous pet loss, living alone, suffering from maladaptive grief) may particularly benefit from pet loss support hotlines, as these options do not require face-to-face contact and may be perceived as less frightening and more convenient [24, 57].

Continuing bonds (CB) are an effort to maintain emotional attachment, or connection, following the death of a pet and therefore represent a continuation of that attachment and an attempt to manage grief [28]. Common continuous bonds used by bereaved pet owners include looking at photos, reminiscing over memories, talking to the deceased, preserving their possessions

(e.g., leash, blanket), and writing letters to their pet [28]. CB can sometimes aggravate and intensify grief experiences, particularly when pet grief is perceived as disenfranchised grief [27, 33]. However, identifying appropriate bonds can be useful to moderate the intensity of grief and be a valuable mechanism of support [27].

Rituals, memorials, memories, and dreams were identified as effective coping mechanisms that help maintain levels of attachment and reduce the intensity of grief [64]. The belief in an afterlife for pets promotes resilience during the grieving process [49] and bereaved pet owners may turn to religious coping [46]. Bereaved pet owners may find comfort in performing religious rituals and bearing the belief that they will be re-connected with their pets in the afterlife [25, 46].

Bereaved pet owners who have more than one pet often find comfort in caring for their remaining living animals [25]. For those without another animal in the household, acquiring a new pet may offer psychological comfort and help pet owners cope with their loss [25, 46]. Approximately one-third of pet owners report adopting a new companion animal as helpful to cope with loss following companion animal euthanasia [56]. Companionship and the act of caring for another companion animal may offer psychological comfort to bereaved companion animal owners [25]. However, some bereaved pet owners may not consider it appropriate to adopt another animal shortly after the loss [30].

Conclusions

The human-pet relationship is unique because pets give their owners unconditional love and companionship. Human-pet bonds may be as strong as relationships between humans. Thus, pet loss may inflict a significant emotional impact upon the companion animal owner and result in a complicated grief response. Furthermore, bereaved pet owners are likely to experience disenfranchisement surrounding their loss. Greif interventions, coping mechanisms, and cognitive behavioral programs may be helpful for some vulnerable pet owners who have high levels of suicidal ideation and depressed feelings over bereavement.

Further research is needed to better understand the cultural differences in the conceptualization of disenfranchised grief and focus on quantifying the use of different coping mechanisms by bereaved pet owners from international samples. Furthermore, the effectiveness of coping mechanisms used by bereaved pet owners should be investigated as this would provide more information for intervention strategies.

References

1. CredereMedia. 2022 https://www.cmmedia.com.tw/home/articles/36475
2. Commercial Times. 2022 https://ctee.com.tw/industrynews/consumption/630849.html#:~:text=%E6%A0%B9%E6%93%9A%E8%B3%87%E7%AD%96%E6%9C%83%E7%94%A2%E6%A5%AD,%E4%BC%81%E6%A5%AD%E5%B0%8D%E6%96%BC%E5%AF%B5%E7%89%A9%E5%B8%82%E5%A0%B4%E8%BA%8D%E8%BA%8D%E6%AC%B2%E8%A9%A6%E3%80%82
3. The Council of Agriculture: Pet registration information system. 2022 https://www.pet.gov.tw/PetsMap/PetsMap.aspx
4. Livesay J: How long do cats live? Here's how long to expect your feline friend's nine lives to last. 2022 https://www.usatoday.com/story/news/2022/06/15/how-long-cats-live/7616721001/
5. Hui Gan GZ, Hill AM, Yeung P, et al: Pet ownership and its influence on mental health in older adults. Aging Ment Health 2020; 24(10): 1605-1612.
6. Shoesmith E, Shahab L, Kale D, et al: The influence of human-animal interactions on mental and physical health during the first COVID-19 lockdown phase in the U.K.: a qualitative exploration. Int J Environ Res Public Health 2021;18(3).
7. Brooks HL, Rushton K, Lovell K, et al: The power of support from companion animals for people living with mental health problems: a systematic review and narrative synthesis of the evidence. BMC Psychiatry 2018; 18(1): 31.
8. Gee NR, Mueller MK: A systematic review of research on pet ownership and animal interactions among older adults. Anthrozoös. 2019; 32(2): 183-207.
9. Tanaka A, Saeki J, Hayama SI, et al: Effect of pets on human behavior and stress in disaster. Front vet sci 2019; 6: 113.
10. Applebaum JW, Ellison C, Struckmeyer L, et al: The impact of pets on everyday life for older adults during the COVID-19 pandemic. Front Public Health 2021; 9: 652610.
11. Centers for Disease Control and Prevention: How to stay healthy around pets. 2022 https://www.cdc.gov/healthypets/keeping-pets-and-people-healthy/how.html#:~:text=There%20are%20many%20health%20benefits,depression%20by%20giving%20us%20companionship
12. Ein N, Li L, Vickers K: The effect of pet therapy on the physiological and subjective stress response: a meta-analysis. ISIS 2018; 34(4): 477-489.
13. Krittanawong C, Kumar A, Wang Z, et al: Pet ownership and cardiovascular health in the US general population. Am J Card 2020; 125(8): 1158-1161.
14. O'Malley CI: How long do dogs live? 2022 https://petozy.com/blogs/about-dogs/how-long-do-dogs-live
15. Coates J: How long do dogs live? 2013 https://www.petmd.com/dog/wellness/evr_dg_how_long_do_dogs_live
16. Coates J: How long do cats live? 2011 https://www.petmd.com/blogs/thedailyvet/jcoates/2011/aug/how_long_do_cats_live-11496
17. Teng KT, Brodbelt DC, Pegram C, et al: Life tables of annual life expectancy and mortality for companion dogs in the United Kingdom. Sci Rep 2022; 12(1): 6415.
18. Urfer SR, Wang M, Yang M, et al: Risk factors associated with lifespan in pet dogs evaluated in primary care veterinary hospitals. J Am Anim Hosp Assoc 2019; 55(3): 130-137.
19. Hewson C: Grief for animal companions and an approach to supporting their bereaved owners. Bereave Care 2014; 33(3): 103-110.
20. Yonan Joe: The death of pet can hurt as much as the

loss of a relative. 2012 https://www.washingtonpost.com/national/health-science/the-death-of-pet-can-hurt-as-much-as-the-loss-of-a-relative/2012/02/21/gIQALXTXcS_story.html?fbclid=IwAR1bPnDUjiGuU1AFhM20usJz0GqLchkjJ1OnVtBTvd0zJoULPT7-oGSAJGw
21. Park RM, Royal KD, Gruen ME: A literature review: pet bereavement and coping mechanisms. J Appl Anim Welf Sci 2021:1-15.
22. Cleary M, West S, Thapa DK, et al: Grieving the loss of a pet: a qualitative systematic review. Death Stud 2022; 46(9): 2167-2178.
23. Behler A, Green J, Joy-Gaba J: "We lost a member of the family": Predictors of the grief experience surrounding the loss of a pet. HAI Bulletin 2020; 8(3): 54-70.
24. Lyons M, Floyd K, McCray H, et al: Expressions of grief in online discussion forums—linguistic similarities and differences in pet and human bereavement. OMEGA 2022; 85(4): 1007-1025.
25. Wong PW, Lau KC, Liu LL, et al: Beyond recovery: understanding the postbereavement growth from companion animal loss. OMEGA 2017; 75(2): 103-23.
26. Crawford KM, Zhu Y, Davis KA, et al: The mental health effects of pet death during childhood: is it better to have loved and lost than never to have loved at all? Eur Child Adolesc Psychiatry 2021; 30(10): 1547-1558.
27. Hughes B, Lewis Harkin B: The impact of continuing bonds between pet owners and their pets following the death of their pet: a systematic narrative synthesis. OMEGA 2022: 00302228221125955.
28. Habarth J, Bussolari C, Gomez R, et al: Continuing bonds and psychosocial functioning in a recently bereaved pet loss sample. Anthrozoös 2017; 30(4): 651-670.
29. Cordaro M: Pet loss and disenfranchised grief: implications for mental health counseling practice. J Ment Health Couns 2012; 34(4): 283-294.
30. Chur-Hansen A: Grief and bereavement issues and the loss of a companion animal: people living with a companion animal, owners of livestock, and animal support workers. Clin Psychol 2010; 14(1): 14-21.
31. KÜBLER-ROSS E: On death and dying. Routledge 1973.
32. Whipple EE: The human–animal bond and grief and loss: Implications for social work practice. Fam Soc 2021; 102(4): 518-528.
33. Kogan LR, Bussolari C, Currin-McCulloch J, et al: Disenfranchised guilt—pet owners' burden. Animals 2022; 12(13): 1690.
34. Bussolari CJ, Habarth J, Katz R, et al: The euthanasia decision-making process: a qualitative exploration of bereaved companion animal owners. Bereave Care 2018; 37(3): 101-108.
35. Barnard-Nguyen S, Breit M, Anderson KA, et al: Pet loss and grief: identifying at-risk pet owners during the euthanasia process. Anthrozoös 2016; 29(3): 421-430.
36. Gibson M, Chalmers D, Ru S: "My lifeline is gone": an exploration of the experiences of veterans following the loss of their psychiatric service dog (s). HAI Bulletin 2022; 11(3): 54-74.
37. Hosey G, Melfi V: Human-animal interactions, relationships and bonds: a review and analysis of the literature. Int J Comp Psychol 2014; 27: 117-142.
38. Spain B, O'Dwyer L, Moston S: Pet loss: understanding disenfranchised grief, memorial use, and posttraumatic growth. Anthrozoös 2019; 32(4): 555-568.
39. Bussolari C, Habarth JM, Phillips S, et al: Self-compassion, social constraints, and psychosocial outcomes in a pet bereavement sample. OMEGA 2021; 82(3)389-408.
40. Leonhardt-Parr E, Rumble B: Coping with animal companion loss: a thematic analysis of pet bereavement counselling. OMEGA 2022: 00302228211073217.
41. Hunt M, & Padilla, Y: Development of the pet bereavement questionnaire. Anthrozoös 2006; 19(4): 308-324.
42. Tal Young I, Iglewicz A, Glorioso D, et al. Suicide bereavement and complicated grief. Dialogues Clin Neurosci 2012; 14(2): 177-186.
43. Adrian JAL, Deliramich AN, Frueh BC: Complicated grief and posttraumatic stress disorder in humans' response to the death of pets/animals. Bull Menninger Clin 2009; 73(3): 176.
44. Adrian JAL, Stitt A: Pet loss, complicated grief, and post-traumatic stress disorder in Hawaii. Anthrozoös 2017; 30(1): 123-133.
45. Matte A, Khosa D, Meehan M: Exploring how veterinary professionals perceive and use grief support resources to support companion animal caregivers in Ontario, Canada. Vet evid 2021; 6(4).
46. McKinney K: Emotion work of coping with the death of a companion animal. Soc Anim 2019; 27(1): 109-125.
47. Shweman DG: Grief counseling for adult pet loss: a primer for mental health professionals. University of Alaska Fairbanks, 2017.
48. Brown OK, Symons DK: "My pet has passed": relations of adult attachment styles and current feelings of grief and trauma after the event. Death Stud 2016; 40(4): 247-255.
49. Testoni I, De Cataldo L, Ronconi L, et al: Pet loss and representations of death, attachment, depression, and euthanasia. Anthrozoös 2017; 30(1): 135-148.
50. Adams CL, Bonnett BN, Meek AH: Predictors of owner response to companion animal death in 177 clients from 14 practices in Ontario. J Am Vet Med Assoc 2000; 217(9): 1303-1309.
51. Kim G: Effects of pet bereavement during childhood and adolescence on Emotion Regulation. Ulsan National Institute of Science and Technology, 2022.
52. McCutcheon KA, Fleming SJ: Grief resulting from euthanasia and natural death of companion animals. OMEGA 2002; 44(2): 169-188.
53. Lavorgna BF, Hutton VE: Grief severity: a comparison between human and companion animal death. Death Stud 2019; 43(8): 521-526.
54. Packman W, Carmack BJ, Katz R, et al: Online survey as empathic bridging for the disenfranchised grief of pet loss. OMEGA 2014; 69(4): 333-356.
55. Eckerd LM, Barnett JE, Jett-Dias L: Grief following pet and human loss: closeness is key. Death Stud 2016; 40(5): 275-282.

56. Park R, Royal K: A national survey of companion animal owners' self-reported methods of coping following euthanasia. Vet Sci 2020; 7(3): 89.
57. Rémillard LW, Meehan MP, Kelton DF, et al: Exploring the grief experience among callers to a pet loss support hotline. Anthrozoös 2017; 30(1): 149-161.
58. Tzivian L, Friger M, Kushnir T: Associations between stress and quality of life: differences between owners keeping a living dog or losing a dog by euthanasia. PLoS One 2015; 10(3): e0121081.
59. Bussolari C, Habarth J, Kimpara S, et al: Posttraumatic growth following the loss of a pet: a cross-cultural comparison. OMEGA 2019; 78(4): 348-368.
60. Packman W, Bussolari C, Katz R, et al: Posttraumatic growth following the loss of a pet. OMEGA 2017; 75(4): 337-359.
61. Zuccala VM: Predictors of post-traumatic growth and stress following the loss of a pet. Carleton University, 2020.
62. Adrian JAL, Stitt A: There for you: attending pet euthanasia and whether this relates to complicated grief and post-traumatic stress disorder. Anthrozoös 2019;3 2(5): 701-713.
63. Matte A: Exploring veterinary professionals' management and pet owners' experiences of companion animal euthanasia. University of Guelph, 2019.
64. Packman W, Carmack BJ, Ronen R: Therapeutic implications of continuing bonds expressions following the death of a pet. OMEGA 2012; 64(4): 335-356.

Review Articles

Social Support Interventions for Preventing Depression in Young Pregnant Women

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Abstract: Depression is a major issue of mental health and the leading cause of maternal mortality during the perinatal period. Young pregnant women have a higher rate of depression than adult pregnancies. The high prevalence of depression is associated with a diversity of negative impacts on both maternal and their children. However, interventions regarding depression care and support provision have been limited. Social support intervention has been shown to be effective in reducing the risk of depression during pregnancy in young pregnant women and their children. Currently, no prior study integrated evidence about social support interventions. Therefore, the study reviewed related literature using the following keywords: depression, social support, young pregnancy. The findings suggested that social support interventions can decrease the risk of depression during pregnancy, which leads to positive health and pregnancy outcomes. Therefore, midwives need to create social support interventions to prevent or reduce the risk of associated depression during pregnancy in young mothers.

Keywords: social support, interventions, prevention, depression, young pregnant women.

(Journal of Suicidology 2022; 17(4): 325-329. DOI:10.30126/JoS.202212_17(4).0013)

Introduction

The pregnancy period is when a pregnant woman is especially susceptible to mental health problems including depression, which is characterized by symptoms such as sadness, low self-esteem, loss of interest, feelings of worthlessness, and suicidal ideation [1]. The prevalence of depression during pregnancy was reported as 15-65% in low to middle-income countries, and 17% in high-income countries respectively [2]. Notably, young pregnant women from disadvantaged backgrounds are more likely than adult pregnant women to effects from depression and other mental health problems [3]. The previous study has reported that the rates of depressive symptoms estimated to be between 16% and 44% in young mothers and in older mothers are between 10% and 15% [4].

Depressive symptoms have been associated with a variety of negative outcomes for both mothers and their infants, if not effectively addressed, can lead to pregnancy complications (anemia, preeclampsia, and preterm delivery), increased risk of postnatal mental health issues, hazardous drinking, and suicidal behaviors [5,6,7,8]. Furthermore, depression is associated with negative infant outcomes such as low birth weight, intrauterine growth restriction, mental retardation, and increased emotional and behavioral problems [9,10,11,12].

There are several factors that contribute to depression during pregnancy risk including unwanted pregnancy, lower socioeconomic status, food insecurity, intimate partner violence or childhood abuse, family problems, obstetric complications and having a history of depression or self-harm during pregnancy [13,14,15,16]. However, when focusing on depression in young pregnant women, found that the major predictors it was coping mechanisms and lack of social support [4,17]. Previous studies have found that providing strong social support can improve social relationships, and family connectedness, and increase coping resources, thereby decreasing the risk of contributing to mental health problems such as depression and anxiety [18]. The study by Bedaso et al. (2021) shows that emotional and material support from spouses, other family members, friends, colleagues, and healthcare providers have protective consequences on young maternal mental health and could prevent negative pregnancy outcomes. More specifically, during pregnancy, high adequate social support has been found to be a protective factor against depression, which leads to positive health and pregnancy outcomes [17].

Social support refers to the support systems providing of assistance and encouragement to other people to help them better cope with physical or emotional problems. Informal social support is usually provided by family members, friends, relatives, or peers, while formal assistance such as community support is provided by professionals/public services (eg, family physicians, nurses, social workers) [19,20]. Social support intervention has been shown to be effective in reducing the risk of depression during pregnancy

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Received: 6 December 2022; **Accepted:** 26 December 2022.

in young pregnant women [17]. Therefore, this article aimed to review the characteristics of social support interventions and recommends that these interventions include the Home Visiting [21], an Early Depression Prevention Program (EDPP) [22], the Centering Pregnancy Plus (CP+) program [23], The Pregnancy Outreach Worker (POW) program [24], the Healthy MOMs Lifestyle Intervention [25], and the REACH program [26]. These interventions may be successful in preventing depressive symptoms among young mothers compared to the controlled conditions.

The Characteristics of Social Support Interventions

All of the studies (6 studies) were designed as randomized controlled trials (RCT) and were provided by various professionals, including nurses, midwives, obstetricians, mental health specialists, psychologists, community health workers, and paraprofessionals trained in the social support programs to decrease the symptoms of depression. Most social support interventions were initiated during the perinatal period, meaning the study started during pregnancy and extended into the postpartum period, and there is the control group was received usual prenatal/ postnatal care (see Table 1). The article reviewed several social support programs as follows.

Home visiting program

A study in France (Dugravier et al., 2013), evaluated the consequences of depression in a perinatal home visiting that prepared by a team of home-visiting psychologists. The program consists of mental health promotion and relationship quality, providing social and emotional support, and managing depression should it occur. The result shows that the intervention group had a significantly lower depression score than the control group. Therefore, healthcare professionals should be received training in home visiting program because the program is essential in closing knowledge gaps in depression investigation, diagnosis, referrals, service access, and reducing depressive symptoms in young mothers.

Early depression prevention program (EDPP)

A study in Thailand (Boobpamala et al., 2022), evaluated the efficacy of an early depression prevention program (EDPP) on coping skills and depression among young pregnant women. This program was provided by health care providers (e.g. nurses, midwives) and developed based on the social support theory with empowerment and self-esteem concepts. The main outcome showed the mean depression scores in the EDPP group were lower than the control group and the mean coping skill score was higher than the control group. Therefore, healthcare providers can apply this program to enhance appropriate coping skills and decrease depression among young pregnant women.

Centering pregnancy plus (CP+) program

Felder et al. (2017) examined in the US to the impact of the CP+ program on prenatal depressive symptoms compared to individual prenatal care. The program was prepared by a trained prenatal care provider (e.g. midwife, obstetrician) and co-facilitator (e.g., nurse, medical assistant), using the social support theory and the self-esteem concept for developed the program. The finding of study found that young mothers assigned ed to the CP+ program experienced greater reductions in prenatal depressive symptoms compared to the individual prenatal care group. The CP+ program consists of the various components of perinatal care (physical and psychological assessment, education/ skills building, and support from facilitators) by which positive mental outcomes and reducing mental treatment by medications. Thereby, healthcare professionals should develop and improve the CP+ program to be for early depression assessment to increase the efficacy of preventing depression in young mothers.

The pregnancy outreach worker (POW) program

Kenyon et al. (2016) used a randomized controlled trial to evaluate the effectiveness of lay support to improve maternal and child outcomes (depression, mother-to-infant bonding, child development, and breastfeeding). The POW program in the UK was provided by healthcare professionals (midwives, obstetricians, and mental health professional specialists), and management for young pregnant women by collaborating with hospitals and the community, which developed based on social and emotional support during the antenatal period to the postnatal period. The primary outcome found that the mean depression scores in the POW group were statistically lower than the control group at 8-12 weeks postpartum, and the secondary outcomes show that the mother-to-infant bonding was significantly better in the POW group and there were no significant finding for other secondary outcomes. The finding from the POWS intervention is important on improves aspects of young mothers psychological health. Thus, healthcare providers in hospitals and community midwifery teams should collaborate and bring this program to promote positive psychological outcomes during pregnancy and after childbirth in young mothers.

The healthy lifestyle intervention (MOMs)

A study in the US (Kieffer et al., 2013), evaluated the effectiveness of the MOMs intervention in reducing depressive symptoms among pregnant and early postpartum, an intervention led by trained community health workers. The MOMs intervention design integrated social support from peers through one-on-one meetings in group discussions and activities. The outcome shows that between baseline and 6 weeks after delivery, MOMs group participants experienced a significant decline in depression scores. The MOMs intervention is led by community health workers, there is a community planned and tailored to follow the culture that can decrease depressive symptoms among young pregnant women. Therefore, mental health professionals should consider the differences across cultures. In other words, services that are open to assessing anxiety and

depression in many ways and that help young pregnant women find the right treatment that aligns with their culture can be found.

The REACH program

Phipps et al. (2013) set a study in the US to estimate the effect of the REACH program on reducing the risk of postpartum depression in first young pregnancies, an intervention conducted based on interpersonal psychotherapy (IPT), social support, and therapeutic strategies (e.g., roleplaying, communication analysis) by healthcare providers. The main result shows that the overall rate of depression in the REACH program group was lower than the control group at 6 months after childbirth. The REACH program was broadly tailored to be culturally suitable and suppliant to young pregnant women from various racial and ethnic backgrounds by expert consultants (in adolescent medicine and depression and prenatal care among low-income minority young women). Therefore, when taking interventions for reducing depressive symptoms in young pregnant women, healthcare providers should assess the racial and ethnic backgrounds of young mothers, knowing this information will enable healthcare providers to respond appropriately to the needs of the young mothers.

Table 1. Characteristics of included studies.

The authors/ Year/ Country	Design	Samples	Description of intervention	Number of sessions and intervention frequency	Timepoint of intervention conducted	Primary outcome measure
Dugravier et al. (2013), France	RCT	N=440, Mean age 18.1 years, Intervention group: n=222 Control group: n=218	Intervention: The participants were given an information paper about ‘‘baby blues’’ and the process to follow if there are depressive symptoms. If identified depression by healthcare providers, they would get more frequent home visits; and if there is severe depression, they would be referred to a community mental health center for addressing.	Number of sessions: A total of 14 home visits. Intervention frequency: 6 times during the perinatal period initiated 7 months of pregnancy and 8 times during the first three months after childbirth.	The assessment was at baseline and 3 months after childbirth for both groups.	EPDS
Boobpamala et al. (2022), Thailand	RCT	N=72, Mean age 17.6 years Intervention group: n=36 Control group: n=36	Intervention: The group of participants will get health education until delivery through video clips which consisted of the following: physical and mental changes, self-care in all third trimesters of pregnancy, complications, and depressive symptoms. Then, they joined the intervention sessions which focuses on empowerment for problem-solving, promotion of self-esteem, reinforcing positive power, emotional adjustment, competence checking, and goal-attainment.	Number of sessions: A total of 4 sessions. Intervention frequency: 4 times during the perinatal period and took time 60-90 minutes for each session.	To evaluate depression and coping skill scores at 9, and 11 weeks after the program.	CES-D
Felder et al. (2017), the United States	RCT	N=1135, Mean age 18 years Intervention group: n=569 Control group: n=566	Intervention: Participants attending the intervention session will be facilitated in discussions about their conduct from pregnancy to the postpartum period such as nutrition, exercise and relaxation, childbearing, infant care and breastfeeding. All participants received the mental health screening and were given information about resources for mental health.	Number of sessions: A total of 10 sessions throughout pregnancy. Intervention frequency: 120 minutes for each session.	To assess maternal depressive symptoms during pregnancy (second and third trimesters), and the postnatal period (6 and 12 months).	CES-D

Table 1 (cont'd). Characteristics of included studies.

The authors/ Year/ Country	Design	Samples	Description of intervention	Number of sessions and intervention frequency	Timepoint of intervention conducted	Primary outcome measure
Kenyon et al. (2016), the United Kingdom	RCT	N=1324, Mean age 21.7 years Intervention group: n=662 Control group: n=662	Intervention: Individual case management including home visits and collaboration with community midwifery teams. To promote antenatal care and to make healthy lifestyle choices, mental health problems were addressed, and midwives also provided information on breastfeeding and infant care.	Number of sessions: No fixed number of sessions. Postpartum POW contact will continue in during pregnancy until 6 weeks after birth. Intervention frequency: The midwives work around 3-7 hours per week depending on the size of their team and the number of pregnant women to be recruited.	The maternal depression was assessed at 8-12 weeks after childbirth.	EPDS
Kieffer et al., (2013), the United States	RCT	N=275, 90% of participants aged between 18-29 years. Intervention group: n=138 Control group: n=137	Intervention: Nine meetings and 2 home visits. Group discussions and activities to increase empowerment and skills to reduce barriers to healthy eating and exercise. Optional weekly group healthy eating and exercise activities. Home visits were similar in curricular content to group meetings.	Number of sessions: 14 sessions in total. Two home visits and nine group meetings during pregnancy; and 2 home visits and 1 group meeting conducted between 2 and 6 weeks after childbirth. Intervention frequency: Conducted weekly.	To evaluate depression scores at baseline, immediately after the intervention, and 6 weeks after delivery.	CES-D
Phipps et al. (2013), the United States	RCT	N=106, Mean age 16 years, Intervention group: n=54 Control group: n=52	Intervention: The program focused on communication skills to manage conflicts, expectations about motherhood, stress addressing, the divergency between "baby blues" and "depression," development of a social support, development of healthy relationships, goal setting, and psychosocial resources for new mothers. Each session includes video snippets, role-playing, homework, and feedback.	Number of sessions: A total of 5 sessions in perinatal period with a postpartum booster session. Intervention frequency: 30-60 minutes in the perinatal period weekly for five consecutive weeks with a single postpartum booster session during hospitalization.	To assess the depression rate at 6 weeks, 3 months, and 6 months after childbirth.	KID-SCID

Note: POW: The Pregnancy Outreach Worker Program; CES-D: Center for Epidemiological Studies-Depression; EPDS: Edinburgh Postnatal Depression Scale; KID-SCID: The Structured Clinical Interview for DSM-IV Childhood Disorder; RCT: randomized control trial.

Conclusion

The evidence from the literature review recommends that social support interventions including the Home Visiting program, EDPP program, CP+ program, POW program, Healthy MOMs Lifestyle Intervention, and REACH program are all effective in reducing or preventing depressive symptoms among young mothers compared to the controlled conditions. The most studies and the participants were focused on young pregnant women who had no high risk and were in western countries, to reduce depressive symptoms. However, the findings of these interventions may not be able to generalize to various populations in different cultures and countries, particularly in low- and middle-income countries. Young women who had mental disorders may have much more barriers in providing social support interventions. Additionally, all the social support interventions in this study base on the evidence of face-to-face interventions and were conducted at home and/or in the hospital, which affects the limited access to effective hospital intervention among the participants, especially during the COVID-19 pandemic. Therefore, researchers

should apply social support interventions in another format such as integrating with e-health or another internet platform to improve continued mental health and long-term well-being for young mothers and their offspring. The psychological needs of young pregnant women with mental health disorders may also need further investigation.

References

1. Bedaso A, Adams J, Peng W, et al: The relationship between social support and mental health problems during pregnancy: a systematic review and meta-analysis. Reprod Health 2021; 18(162): 2-23.
2. Dennis CL, Falah-Hassani K, Shiri R: Prevalence of antenatal and postnatal anxiety: systematic review and meta-analysis. BJPsych 2017; 210: 315-323.
3. Edwards RC, Thullen MJ, Isarowong N, et al: Supportive relationships and the trajectory of depressive symptoms among young, African American mothers. JFP 2012; 26(4): 585–594.
4. Govender D, Naidoo S, Taylor M: Antenatal and postpartum depression: prevalence and associated risk factors among the adolescents in KwaZulu-Natal, South Africa. Depress Res Treat 2020; 2020, 5364521.
5. Dewing S, Tomlinson M, le Roux IM, et al: Food insecurity and its association with co-occurring postnatal depression, hazardous drinking, and suicidality among women in peri-urban South Africa. J Affect Disord 2013; 150(2): 460-465.
6. Hodgkinson S, Beers L, Southammakosane C, et al: Addressing the mental health needs of pregnant and parenting adolescents. Pediatrics 2014; 133(1): 114-122.
7. Howard LM, Flach C, Mehay A, et al: The prevalence of suicidal ideation identified by the Edinburgh Postnatal Depression Scale in postpartum women in primary care: findings from the RESPOND trial. BMC Pregnancy Childbirth 2011; 11: 57.
8. Lieberman K, Le HN, Perry DF: A systematic review of perinatal depression interventions for adolescent mothers. J Adolesc 2014; 37(8): 1227-1235.
9. Branquinho M, Rodriguez-Munoz MF, Maia BR, et al: Effectiveness of psychological interventions in the treatment of perinatal depression: a systematic review of systematic reviews and meta-analyses. J Affect Disord 2021; 291: 294-306.
10. Hayes LJ, Goodman SH, Carlson E: Maternal antenatal depression and infant disorganized attachment at 12 months. Attach Hum Dev 2013; 15: 133-153.
11. Kvalevaag AL, Ramchandani PG, Hove O, et al: Paternal mental health and socioemotional and behavioral development in their children. Pediatrics 2023; 131: e463-e469.
12. Madigan S, Oatley H, Racine N, et al: A meta-analysis of maternal prenatal depression and anxiety on child socio-emotional development. J Am Acad Child Adolesc Psychiatry 2018; 57 (9): 645-657.
13. Al Khames Aga QA, Bataineh YA, Saadeh MJ, et al: Perinatal depression. Prevalence, suicidal idea, and associated factors. J Pharm Sci 2020; 12(1): 112-118.
14. Ranasinghe JC, Premadasa J, Agampodi SB: Employment: a protective factor against antenatal depression in a rural setting with high incidence of self-harm and suicide? RCOG World Congress 2015; 122 (S1): 298.
15. Shamu S, Zarowsky C, Roelens K, et al: High-frequency intimate partner violence during pregnancy, postnatal depression and suicidal tendencies in Harare, Zimbabwe. Gen Hosp Psychiatry 2016; 38: 109-114.
16. Zhong QY, Gelaye B, Rondon MB, et al: Using the Patient Health Questionnaire (PHQ-9) and the Edinburgh Postnatal Depression Scale (EPDS) to assess suicidal ideation among pregnant women in Lima, Peru. Arch Womens Ment Health 2015; 18(6): 783-792.
17. Kim JJ, Silver RK, La Porte LM, et al: Clinical Correlates of Maternal Suicidal Ideation Detected by Perinatal Depression Screening. OBGYN 2014; 123 (60S).
18. Shiba K, Kondo N, Kondo K. Informal and formal social support and caregiver burden: The AGES caregiver survey. Int J Epidemiol 2016: 26(12); 622-628.
19. Psychology Dictionary. Social support [Internet] 2013 [cited 2022 December 18]; Available from: http://psychologydictionary. org/social-support/
20. Gariepy G, Honkaniemi H, Quesnel-Vallee A: Social support and protection fromdepression: systematic review of current finding in Western countries. BJPsych 2016: 209(4); 284-293.
21. Dugravier R, Tubach F, Saias T, et al: Impact of a manualized multifocal perinatal home-visiting program using psychologists on postnatal depression: the CAPEDP randomized controlled trial. PLOS One 2013: 8(8); e72216.
22. Boobpamala S, Kongvattananon P, Quinn Griffin MT: Effectiveness of an early depression prevention program on coping skills and depression among pregnant adolescents: a randomized controlled trial. PRIJNR 2022; 26(2); 296-312.
23. 2Felder JN, Epel E, Lewis JB, et al: Depressive symptoms and gestational length among pregnant adolescents: cluster randomized control trial of Centering Pregnancy plus group prenatal care. J Consult Clin Psychol 2017; 85(6): 574-584.
24. Kenyon S, Jolly K, Hemming K, et al: Lay support for pregnant women with social risk: a randomised controlled trial. BMJ Open 2016; 6(3): e009203.
25. Kieffer EC, Caldwell CH, Welmerink DB, et al: Effect of the healthy MOMs lifestyle intervention on reducing depressive symptoms among pregnant Latinas. AJCP 2013; 51(1-2): 76-89.
26. Phipps MG, Raker CA, Ware CF et al: Randomized controlled trial to prevent postpartum depression in adolescent mothers. AJOG 2013; 208(3): 192.e1-192.e1926.

Special Articles

Hidden Suicides in East and South-East Asia

John Snowdon

Abstract: This article focuses on the accuracy of suicide statistics in 14 jurisdictions in East and South-East Asia. Inaccuracies most commonly occur when (1) registration of a country's deaths (whatever the cause) is markedly incomplete, and (2) there is mis-recording or mis-coding of the cause of death (c.o.d.), sometimes despite almost complete registration. The World Health Organization (WHO) criticizes those certifying death who assign inexact ICD (International Classification of Diseases) codes such as 'old age', which cannot clearly indicate the underlying c.o.d. WHO refers to these as 'unusable' or 'garbage' codes. Two examples are 'Ill-defined and unknown cause' (ICD-10 code R99) and 'event of undetermined intent' (EUI, coded Y10-Y34); significant numbers of suicides have, to an extent that varies between nations, been assigned one of these codes. Suicides coded in this way, along with others mis-coded as accidental or to other codes have been called 'hidden suicides'. The quality of mortality statistics in 5 of the above 14 nations, and of one third of WHO's member states (mostly high income), has been rated as high, though commonly with caveats regarding earlier years. Lower income nations that lack resources to attempt collection of data regarding all deaths may use randomized household surveys. Where countries report low death registration rates and/or unacceptable garbage code rates, WHO publishes estimated suicide rates, based on the mortality data supplied by member states to the WHO Mortality Database. Rates of suicide, R99, EUI and accidental death vary considerably. It is recommended that all such rates be published at the same time as the suicide rates, and that WHO make ICD-11 mortality rates easily accessible online (as they were before October 2019). Well-resourced nations should be encouraged to help fund collection and analysis of suicide and hidden suicide data in under-resourced nations.

Keywords: suicide rates, misclassification, East Asia, South-East Asia, mortality rates, undetermined deaths.

(Journal of Suicidology 2022; 17(4): 330-336. DOI:10.30126/JoS.202212_17(4).0010)

Introduction

The world population in late 2022 is 8 billion. The number of worldwide deaths in 2017 was estimated by the Global Burden of Disease Study to be just under 56 million, the number of suicides being estimated as approximately 800,000 to 820,000 [1]. Thus suicide reportedly explains 1.45% of the world's deaths. Or does it? It is widely believed that the numbers of suicides reported by member nations to the World Health Organization (WHO) for inclusion in the WHO Mortality Database under-record the true figures --- for various reasons. Even in countries where medical practitioners or coroners or forensic specialists certify what they believe to have been the cause of death (c.o.d.), it is understandable that sometimes these well qualified arbiters fail to record deaths as suicides. Sometimes information provided to them by relatives or other informants was untrue, or the information available to them was not adequate enough for them to certify a definite c.o.d. In certain jurisdictions there may have been insufficient resourcing to allow the further investigations that the certifier would like. In some cases the certifiers want to avoid calling deaths suicides in order to spare the feelings of next-of-kin or because it would affect life insurance claims, or because suicide in their country is illegal. And in nations where, for financial or other reasons, there is no requirement for medical certification of each death, it would seem probable that the likelihood of the c.o.d. being recorded incorrectly, by whoever has been given the task of gathering data on all deaths in their local area, is increased.

A term commonly used, if referring to a suicide that has been recorded (or coded, using the 10th or 11th edition of WHO's International Classification of Diseases; ICD-10 or ICD-11) as a condition other than suicide, is 'hidden suicide' [2]. The three groups of codes most commonly assigned when misclassifying suicides are thought to be
(1) accidental death -- by poisoning (X40-49), drowning (W65-74), fall from a height (W13, W15), car crash or (less commonly) firearm mis-use, stabbing or other type of injury;
(2) event of undetermined intent (EUI, coded Y10-34); and (3) ill-defined or unknown cause of death (R99) or exposure to an unspecified factor (X59). It is possible that some deaths assigned natural disease codes such as R-codes, particularly R54 (senility) or R96 (sudden

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Received: 7 December 2022; **Accepted:** 20 December 2022.

death), or I46 (cardiac arrest), or I50 (heart failure), may have resulted from the person deliberately causing their own death, but in the absence of anything pointing to a need for further investigations, it is unlikely that a suicide will be suspected. In addition, it is possible that deaths coded as due to mental or behavioral disorders, such as depression, may have been purposeful self-killing; such coding should surely prompt further questioning and a verbal autopsy.

The main focus of this opinion piece is on how best to gather accurate mortality data, particularly regarding suicides and 'hidden suicides' in the nations of East and South-East Asia. These include all members of the Association of South East Asian Nations (ASEAN: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Viet Nam), and three nations in East Asia (China, Japan and the Republic of Korea) plus Taiwan. Table 1 provides a WHO comparison of the 2019 crude suicide rates in these 13 nations. The rates in Taiwan, Australia and England & Wales are also shown. The percentages of deaths that were recorded as suicides are tabled; these were calculated after ascertaining the total numbers of deaths in each of the countries in 2019 [3]. It is of particular interest that the percentages of total deaths that were reported as suicides in six of these nations was 0.8 or less; in the Philippines it was 0.4, and in Indonesia and Myanmar it was 0.3.

The ratio of male to female suicides in China was reported as 1.6 : 1, whereas in 2009 it had been 0.9. In all the other listed East and South-East Asian nations, the gender ratio was 2 or more, the ratio being greater than 3 : 1 in Thailand, Malaysia, Myanmar, Brunei and Indonesia.

The Quality of Mortality Statistics

A recent review provided an overview of c.o.d. statistics in the above countries, other than Taiwan [4], and stated that the quality of c.o.d. statistics in Asia is often insufficient: "in most middle- and low-income countries, death registration is not complete. Even among registered deaths, causes of death are not properly stated and compiled".

WHO [5] examined the usability of vital statistics reported to them by 194 member states, other than the eleven with populations lower than 90,000. The chief determinants of how WHO assesses quality of mortality statistics are

(1)completeness of the data, and whether most or all deaths in a country are being identified and registered, and

(2) the extent to which causes of death are assigned codes that either cannot or should not be used when identifying the underlying cause of a death (e.g. 'old age') or that provide no indication about what was the probable underlying c.o.d.; these 'garbage codes' bias a country's true pattern of mortality [6].

WHO calculates the proportion of garbage codes used in the mortality statistics compiled by different nations , and uses them, together with estimated completeness of the data, to classify countries according to the quality of their mortality data [5]. Japan, the Republic of Korea, Singapore and the Philippines are reported by WHO to have provided multiple years of mortality data with high completeness and quality [5]. They did not refer to Taiwan, but there is good reason to include this jurisdiction among those that provide high

Table 1. Rates of suicide (X60-84) in East and South-East Asia, Australia and England & Wales in 2019 [32].

ION	Total suicide rate per 100,000	Male suicide rate	Female suicide rate	Gender ratio: Male to female	Number of suicides in 2019	Suicides as % of total deaths
Republic of Korea	28.6	40.2	16.9	2.4	14636	4.7
Taiwan	16.4	21.8	11.0	2.0	3864	2.3
Japan	15.3	21.8	9.2	2.4	19466	1.3
Singapore	11.2	15.0	7.1	2.1	650	2.4
Thailand	8.8	15.0	2.9	5.2	6147	1.2
China	8.1	9.8	6.2	1.6	116324	1.1
Viet nam	7.5	10.4	4.7	2.2	7249	1.1
Malaysia	5.7	8.9	2.3	3.9	1823	1.1
Laos	5.4	7.6	3.2	2.4	390	0.8
Cambodia	4.9	7.0	2.8	2.5	800	0.8
Myanmar	2.9	4.9	1.1	4.5	1565	0.3
Brunei	2.7	4.4	0.8	5.5	12	0.6
Indonesia	2.4	3.7	1.1	3.4	6544	0.3
Philippines	2.2	3.1	1.2	2.6	2325	0.4
Australia	12.5	18.6	6.4	2.9	3150	1.9
England & Wales	8.3	13.0	3.8	3.4	4795	0.9*

Note: *England & Wales total of suicides + EUI deaths in 2019 = 5652 (1.06% of total deaths).

quality mortality data. WHO found the mortality statistics in Malaysia and Brunei to be of moderate quality, and Thailand's to be of low quality, but stated that death registration data from China, Cambodia, Indonesia, Laos, Myanmar and Viet Nam were unavailable or unusable due to quality issues.

In recent years, fewer than 40% of deaths in Myanmar, Indonesia, Cambodia and Laos have been registered. It appears that most countries that report their mortality (including suicide) statistics to WHO obtain these data from household surveys, though whether in each country the survey is representative of all of the nation's sub-populations is likely to be variable.

China has been assessed by WHO as providing unusable data in relation to estimating mortality rates [4], but the unusability should be questioned. C.o.d. statistics are available from China, having been compiled by conducting surveys of county-level municipalities that were/are selected as being nationally representative. The population of the 605 sites adds up to about 338,000,000, which is 24% of the whole population of China, and has been regularly monitored since 2013. Only 1.2% of total deaths are coded as of unknown cause. While recognizing the selectivity of such sampling, studies using such data have purported to show the suicide rate to have decreased from 19 per 100,000 in 1990 to 9 per 100,000 in 2017 [7]. The findings are believable and useful, and provide an example of how countries lacking the means to gather data from their whole population can acquire data that demonstrate changes in suicide rate, even if the rates themselves may not be accurate.

Similarly, Indonesia regularly conducts a nationally representative sample survey in 128 districts, covering 8 million people, and obtains c.o.d. information through verbal autopsy interviews conducted at the village level; the data could be useful in estimating the suicide rate, though (as pointed out previously) data obtained from relatives without added information from doctors or forensic experts may well not be accurate.

Although WHO [5] referred to mortality data from Viet Nam, too, as unavailable or unusable, two main systems in that country do collect primary mortality data, one being operated by the Ministry of Justice and the other by the Ministry of Health (MoH). Completeness and accuracy of c.o.d. reporting in Viet Nam was assessed in 2014 by gathering data from 26 local communes (15 urban, 11 rural) where 1477 deaths were known to have occurred; local health surveillance programmes such as HIV and Maternal and Child Health services provided enhanced investigative detail in addition to what the two main systems had used [8]. Completeness of registration by one or other of the two main systems occurred in 1365 cases (93%), all being followed up by verbal autopsy. Forms (called 'A6') used by MoH staff led to 21% of deaths being coded as ill-defined or unknown (R99), while verbal autopsy led to 14% being coded R99. The study did not record the number of suicides, nor the number of 'undetermined deaths', but the study suggests it could be feasible to use surveillance programmes in nationally representative areas to estimate the true suicide rate in Viet Nam. Ideally, however (as elsewhere), relevant data should be obtained concerning all deaths in Viet Nam.

WHO deems the quality of mortality statistics in Malaysia and Brunei to be moderate rather than high: almost all deaths are registered, but in Malaysia, the proportion of medically certified deaths was only 68% in 2018, and that proportion declined in 2019. A study of a nationally representative sample of deaths in 2013, using medical records and (for deaths outside hospitals) verbal autopsy, showed that most of the 30% recorded as dying from poorly defined causes could be reclassified to a specific cause [9]. The most commonly used c.o.d. used in non-medical certification of deaths is 'old age 65 years and over', comprising 17.7% of all deaths [4]. It was noted that in 1975-1990 a reduction in suicide rate was accompanied by a rise in undetermined violent deaths, indicating "that the misclassification of suicide deaths had occurred on a large scale" [10].

In Brunei, many deaths are assigned to codes for 'other diseases' and details are not published online [4].

Misclassification Even if Death Registration Rates are High

WHO rates Thailand's mortality data as of low quality, but this is not because completeness of death registration is low; it is largely because of the very high rate at which deaths are assigned to garbage codes. Around 2005 the completeness of adult death registration ranged from 80% to 95% but about 40% of deaths were coded R00-R99. A cross-sectional study of a nationally representative sample of deaths in 2005 was investigated through verbal autopsy. This reassessment of c.o.d. led to a "massive reduction in the percentage of deaths assigned to ill-defined causes" from about 40% to about 5% [11]; "many injuries in the study sample with nonspecific causes were reallocated to specific causes…. highlighting suicide, assault and drowning". Evidently, however, the study did not lead to widespread use of verbal autopsy: the suicide rates reported to WHO in 2013-2016 were male 9.58, female 1.90, total 5.74 per 100,000 [12]. WHO's estimated rates of suicide in Thailand in 2018 and 2019 were, respectively, 9.05 and 10.06, but EUI rates were recorded as 10.1 and 7.2, while rates of deaths coded R00-R94 plus R96-99 were an astonishing 161.5 and 161.2. The reason why WHO's estimated rates are nearly double those calculated from the figures provided to WHO by Thailand is largely because rates of deaths coded to garbage codes were so high. The differences each year between WHO estimates and rates of suicide deaths reported by each nation are largely based on information regarding deaths assigned to so-called garbage codes.

The quality of mortality statistics in a majority of countries around the world has been criticized [13] because of over-use of 'garbage codes' to document mortality rates. It is important to recognize that some garbage codes do provide pointers to what caused the death: for example, mostly they differentiate whether the manner of death was 'natural' (e.g. cancer, infection, cardiovascular or cerebrovascular conditions) or due to an external cause such as poisoning or injury; some give indicative information by registering that the main site of pathology was a particular body organ. And sometimes the 'ill-defined' and 'unknown cause' labels are fully appropriate – providing all relevant investigations and enquiries have been pursued exhaustively.

WHO rates the quality of mortality statistics in

Japan as high. It is interesting, therefore, that 9.6% of all deaths in Japan in 2020 were attributed to 'senility', the assigned ICD code being viewed by WHO as a garbage code. The rate of EUI deaths was 2.0 but rates of death assigned to R-codes were over 100; the R99 rate in 2015 was 8.1. Whether some suicides in Japan are 'hidden' as senility deaths might be detected by conducting verbal autopsies in all cases where the c.o.d. was certified as senility, but it could be expected that the 'yield' would be small, and expensive to obtain. Note that although Japan's crude suicide rate was high (15.3), its age-standardised suicide rate in 2019 was only 12.2; the higher crude rate is related to having a high proportion of very elderly people in its population, and a death rate of 10.65 per 1000; the percentage of deaths that were suicides was 1.4.

Korea's mortality statistics are also considered to be of high quality, though this was not the case until the early 2000s. Death registration processes in Korea started being modified in 1999; the quality of the death statistics and the accuracy of identifying suicides have improved. Chan at al [14] examined the proportional change of death numbers across suicide, undetermined deaths and accidental deaths in Korea from 1992 to 2011: the suicide rate increased from 8.2 to 26.0, the undetermined death rate increased from 1.7 to 3.4, and the accident rate decreased from 12.9 to 5.2, contrasting to a small increase in the accident rate in Japan over the same period. Chan et al [14] estimated that 43% of the apparent increase in suicides reflected improved accuracy, but other contributors to the increase were cultural factors, a global economic crisis and a change in method of self-killing. There has been reduced use of R-codes, but even now, the third most commonly assigned c.o.d. in Korea is 'other', which pertains to R00-R99 codes (rate 54.7 in 2018-2019), and corresponds to 10% of all Korean deaths. The R99 rate in 2015 was 11.4.

Singapore also has high quality mortality statistics, but here the rate of deaths coded R00-R99 is only 1.3 per 100,000.

In Taiwan during the 1990s, rates of suicide and undetermined deaths increased, but reductions occurred in deaths classified as accidental (poisoning or drowning), suggesting that there had been misclassification of suicides prior to that time. Chang et al. [15] wrote that suicide rates were being underestimated by more than 30% in Taiwan because "some suicides are 'hidden' amongst deaths certified to other causes." Taiwan is now rated as having high quality mortality statistics: its crude suicide rate in 2020 was 15.35 per 100,000, though its R00-R99 rate was 28.47. If the senility and SIDS deaths are removed from the R00-R99 total, the rate was 18.36.

In 2019, WHO rated the quality of mortality statistics in the Philippines at the same high level as Korea and Japan, which seems surprising when noting that WHO reported the Philippines suicide rate in 2019 as only 2.2; data published by the Philippines Statistics Authority (PSA) showed there had been 2808 suicides in 2019 (2.6 per 100,000), but 4418 in 2020 [16]. A study in 2018 noted that Municipal Health Officers (MHOs) in the Philippines certified a high proportion of 'out-of-facility' deaths as having an ill-defined cause (i.e. R99); most MHOs had had no training in death certification [17]. The PSA 2022 report [18] showed a revised 2020 figure of 4892 suicides (4.5 per 100,000; 0.8% of all deaths), 3940 male, 952 female. There was no clear evidence of an explanatory concurrent reduction in deaths attributed to something else. The PSA reported the rate of accidental drowning and submersion deaths was 3.1 per 100,000 in 2019 and 2.5 in 2020, but the rate of deaths coded R00-R99 in 2019 was 21.4 (69% of them being of people aged over 70 years) and 23.9 in 2020. The number of Y10-Y34 deaths was not shown. Preliminary data for 2021 show 3883 suicides (3.5 per 100,000).

The fact that the suicide rate in the Philippines appears to have risen dramatically in the last two years raises a question: could the previously reported very low rate have been attributable to misclassification of suicides? Their estimates were persistently low – and lower than the rate reported by the PSA in 2019. Unfortunately, since October 2019, data from WHO's mortality database, including numbers/rates of R99 and EUI deaths, have not been as readily accessible online. It would be very useful to examine whether these rates have fallen as the suicide rates have escalated. There is good reason, when nations reveal their suicide rates in a particular year, to report the concurrent rates of Y10-34 (EUI) and R99 deaths, and to comment , too, on rates of accidental death that might have been suicides. The same should apply when WHO publishes its estimates, so that readers can assess whether they appear to be rational.

Inaccuracies of Suicide Data Attributed to So-called 'Unusable' or 'Garbage' codes

Misclassification of suicides occurs in nations all around the world. Rates of deaths coded to categories believed to be havens for 'hidden suicides' vary, sometimes hugely, between nations assessed as reporting high quality mortality statistics as well as those where quality is reportedly lower. Four high-income English-speaking countries exemplify misclassification issues even though they have all been assessed as providing high quality mortality data. In countries that have insufficient resources to gather and analyse such data, it is understandable that some countries cannot yet provide high quality statistics, but the following examples show that even in nations that should have abundant resources, processes can go wrong. We can learn from our own or others' mistakes!

1. The United Kingdom (UK)

Twenty years ago, Lester [19] wrote that "For many years now Great Britain alone among the industrialised nations of the world has been misclassifying suicides. Thus, data on the suicide rate in Great Britain have poor validity". Around that time (20 years ago), various researchers in England & Wales were publishing studies that showed that 'open verdicts' were being handed down by coroners in around 40% of cases of deaths judged by psychiatrists, on the balance of probabilities, to be suicides [20]. In a study of coroner's files concerning people thought by psychiatrists to be probable suicides, 60% of the cases (123 out of 205) where the death was a consequence of poisoning, and 19 out of 25 drowning deaths, attracted open verdicts [21]. These verdicts would be coded as EUIs, i.e. 'undetermined deaths'. Women were more likely than men to choose

poisoning as a means of suicide, and open verdicts were more common among women than men. At the same time, coroners increased their use of accident rather than suicide verdicts, particularly for deaths involving poisoning [22]. However, Linsley at al. [20] stressed that "not all open verdicts are suicides".

Because for decades it has been recognized that a majority of deaths in the UK for whom coroners delivered 'open verdicts' were probably suicides, British suicide researchers have tended to include open verdict deaths in epidemiological and other studies of suicide, and in the early 2000s the British Office of National Statistics started combining suicides with EUI deaths when publishing official suicide figures. In due course the tabled data showing suicide rates over the last few decades have been adjusted to show the official suicide rates as being the combined suicide + EUI rates. However, nations still code c.o.d. using the ICD, and the mortality rates of suicides (X60-84) and EUI deaths (Y10-34) are reported separately to WHO. The suicide rate in England & Wales averaged 7.34 in 2013-2019, reaching 8.27 in 2019, but the EUI rate progressively fell from 2.10 to 1.48 in 2013-2019. The accidental poisoning rate progressively increased from 4.1 to 6.56 in 2013-2019 and was reported as 7.10 in 2020. The R99 rate has fluctuated (but not much) around 2.1. The patterns of male and female changes in these rates have been similar to changes in total rates.

The UK's mortality data have been rated as of high quality, but the rate of deaths coded as intentional self-harm (X60-84) using the ICD provides an inaccurate portrayal of the frequency of self-killing in Britain; psychiatrists and the government change the picture by adding in EUI death numbers when reporting suicide rates. Most other countries do not. Various nations report EUI rates that in 2015 were lower (Italy 0, Spain 0.1, Holland 0.2, France and Australia 1.0), but rates in Canada (1.9), Japan (2.1), Korea (3.5) and Portugal (7.6) were higher [23, 24]. Presumably, differing processes in gathering and coding data account for these differences. It may also be that there is variation between countries in the proportion of deaths coded as EUIs that were in fact suicides. Some or a lot may have been accidental.

EUI deaths may be a haven for hidden suicides, but so, too, may R99 deaths. Most R99 deaths are not suicides; maybe 2% of them are [25]. Even among nations assessed as providing high quality mortality statistics, R99 rates differ hugely: in England the rate is relatively low, but 2015 rates were higher in Australia (6.2), Spain (7.65), Japan (8.05), Korea (11.4), Holland (14.9), Germany (19.25), Portugal (27.3) and France (33.0) [23].

2. Australia

De Leo et al [26] showed that under-reporting of Australian suicide rates grew during 2002 to 2006. Reasons were considered to include (1) absence of a central authority for producing mortality data, (2) inconsistent coronial processes for determining intent, (3) problematic collection and coding methods, and (4) lack of systemic resourcing, training and shared expertise. This was in a well-resourced country! The Australian Bureau of Statistics had stated that "there has been an increase in recent years in the number of open coroners' cases. Where cases are not finalized and the findings are not available to the ABS in time for publication of cause of death statistics, deaths are coded to other accidental, ill-defined or unspecified causes rather than suicide" [27]. In 2007, an ABS document stated that "the ABS uses a strict interpretation of the ICD-10 coding rules" and emphasized the imperative of defaulting to "accident" when suicide intent was not evident [28]. Over the next few years, changes were put in place to correct some of the deficiencies that had crept into the data-processing system. Data that had already been documented were revised, so that the large numbers of deaths that had been labelled as having "undetermined" or "ill-defined" causes were reduced, and several hundred 'new' cases were added to the 2053 suicides in 2007 that had already been reported [28].

In 2009, the ABS introduced data revision processes that allowed additional information received to be added in two rounds of revisions at 12 and 24 months after the initial processing of coroner certified deaths. Thus, coders have been assisted in assigning more specific causes, once a coroner's verdict or other information allows them to record a non-garbage cause/code such as suicide or accident; they can replace the previous accident 'default' category for ambiguous cases, and assign revised codes to those initially coded as "ill-defined and unknown" (R99). Codes recorded 24 months after initial processing (33 to 45 months after the deaths were registered) remain unchanged thereafter. Thus the preliminary c.o.d. data about deaths in 2021 were initially published by the ABS in October 2022 and will be revised in October 2023 and finalized in October 2024. The 2021 suicide rate reported in 2022 will probably be about 5% higher when revised in 2023, and may be even higher at finalization; the R99 rate will have come down a lot, but the EUI rate may have increased.

3. Canada and the United States (US)

Chan et al. [14] suggested that the US might have a problem comparable to the one experienced in Korea in the early 2000s. As discussed above, they found that in the 1990s and early 2000s Korea appears to have misclassified large numbers of suicides as accidental deaths. The US currently has a horrific and escalating narcotic abuse epidemic: Oquendo and Volkow [29] commented that the true proportion of suicides among opioid-overdose deaths is between 20% and 30% but could be even higher. A decade ago, relatively early during the opioid crisis, Rockett et al. [30] declared that the proportion of poisoning deaths officially attributable to suicide seemed implausibly small. In Canada, too, it seems likely that there could be a high proportion of 'hidden suicides' among the escalating numbers of people there who die from overdoses of opioids and or stimulants. Yet since 2011 the rates of opioid and non-opioid drug suicides and also of drug deaths of undetermined intent have decreased substantially [31]. The decrease in suicide rates in parallel with an escalating overdose death rate is surprising since (1) substance abuse is a known risk factor for suicide, (2) availability and ease of access to a lethal means of suicide have been increased, (3) prescription opioids are known to increase the risk of depression, and (4) Canadian doctors have been urged to increase their prescribing and dosage

of opioids in treating chronic pain, thus making lethal drugs more available for people with known tendencies towards suicide. It is possible that changes in procedures or policies could have led to some (or many) suicides being misclassified as R99 deaths, and the R99 rate increased considerably during 2017-2020. The possibility of suicides being 'hidden' as accidents or as R99 deaths could be addressed by rigorous investigation of a series of overdose deaths, including by verbal autopsy. It seems strange that the deaths were labelled as "ill-defined and unknown cause" at the same time as recording a reduction in the proportion of fatal drug overdoses with undetermined intent. Maybe questions about intent were not asked.

Discussion and Conclusion

I have visited (with admiration and enjoyment) half of the above-named Asian nations, some of them three or more times. I am writing this opinion piece in order to provoke discussion of what suicidologists can and should do to support the governments in achieving (where it has not been done already) high quality statistics regarding suicide rates in these nations. These are my own opinions, which are not necessarily shared by colleagues with expertise in suicide prevention.

Firstly, to state the obvious, nations need to gather and analyse data about suicides and hidden suicides in their own countries in order to better understand the factors that lead to or might help guard against suicide in their particular cultural and socio-economic settings. They should know about age and gender patterns of suicide and how they have changed over time. For example, there have been remarkable changes in these age patterns in Australia and Japan in the last 50 years; there are reasons why age patterns differ considerably between nations. Taiwan has a different age pattern of suicide from Australia; we can consider possible reasons. We don't know much about the age pattern of suicide in Viet Nam but would like to, because it would help in planning preventative interventions.

Because in various countries not enough resources have been available to enable registration of all or most deaths, let alone to determine c.o.d., we do not know what the suicide rate is, nor the age and gender patterns of suicide in those nations. WHO has made estimates, but these could be wrong. One way to obtain indicators concerning the rate and patterns has been to conduct surveys of representative populations within the countries. China has done this, looking at more than a quarter of its population, and the findings have been useful in demonstrating changes in rate and age and gender patterns. Publications have shown (see above) that Indonesia, Malaysia and Thailand have tried, too, and maybe others have provided indicative mortality data to WHO. Viet Nam collects mortality data but although WHO publishes estimates of their suicide rates, I have not yet been able to source Viet Nam-published figures regarding their suicide rates or patterns.

Korea, Japan and Singapore publish high quality mortality statistics, and so does Taiwan, though even amongst them (for example, in relation to use of 'senility' as a c.o.d.) there are reasons to be cautious about finalized figures. The same has applied to countries around the world, and I have given examples above, in relation to Australia, England & Wales, Canada and the US. All of these 8 named jurisdictions (plus Thailand and others) report close to 100% registration of deaths, but questions arise in relation to 'hidden suicides'. To what extent do they and other countries of East and South-East Asia code deaths to so-called garbage codes, particularly 'ill-defined and unknown cause' deaths (coded R99) and EUI deaths (coded Y10-34)? Thailand, in spite of research using verbal autopsy showing that other (usable) codes can be found to be appropriate for most of the deaths coded R99 in Thailand, still reports very high rates of R99 deaths. Korea has continued to report an unacceptably raised R99 rate. Data from other nations is available regarding R-coded deaths, but the R99 rate is commonly not readily accessible.

The accuracy of suicide rates is unknown in a majority of East and South-Eastern nations even if the death registration rate is near to complete. This is because we do not know to what extent high EUI and R99 rates and garbage rates (e.g. R-coded) are attributable to 'hidden suicides'. Most R99 deaths were not suicides [25] but even if only a small proportion were, this could correspond to a significantly higher suicide rate. Most EUI deaths may have been suicides, but may not in some countries. A small percentage of those whose deaths were certified as due to senility may have purposely killed themselves. In all these cases, the best way to be surer about c.o.d. is probably to conduct a probing verbal autopsy. This will not be practicable in most cases, but research studies in large representative populations in different nations could tell us how commonly R99 and EUI deaths might have been suicides. We already know that most EUI deaths in England & Wales were probably suicides [20] but we don't know if this applies in Mexico, for example. And there have been almost zero such studies of how often R99 deaths were suicides.

It is recommended

(1)That all countries, when publishing their number and rate of suicides in the last year, publish, at the same time, the numbers of EUI and R99 deaths over the same period, preferably plus numbers of deaths assigned to other selected 'unusable' codes, and of reported accidental poisoning and drowning deaths.

(2)That WHO make ICD-11 data on mortality rates as shown in the WHO Mortality Database (suicide, EUI, R99, etc) easily accessible online, as are the Australian and Taiwan mortality figures.

(3)That well-resourced nations, WHO and the US National Institute for Mental Health be invited to provide help to nations such as Viet Nam to plan and conduct studies of rates of suicide and 'hidden suicide' in nationally representative populations.

(4)That WHO take steps to ensure that data-gathering services in all member states are funded to acquire complete death registration details across their nations in order to more accurately report suicide and 'hidden suicide' statistics.

References

1. Roth GA, Abate D, Abate KH, et al: Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet 2018: 392(10159): 1736-1788.
2. Snowdon J, Choi NG: Undercounting of suicides: where suicide data lie hidden. Glob Public Health 2020; 15(12): 1894-1901.
3. Our World in Data: Number of deaths per year, 2019. 2022 https://ourworldindata.org/grapher/number-of-deaths-per-year
4. ERIA Study team: Cause of death statistics in ASEAN+3 countries. In: R.Heiko and O.Komazawa, eds. Health and Long-term Care Information in Ageing Asia. ERIA Research Project Report FY2022 No. 07, 2022. Jakarta: ERIA, 2022; 1-33.
5. World Health Organization, Department of Data and Analytics, Division of Data, Analytics and Delivery for Impact: WHO methods and data sources for country-level causes of death 2000–2019. In: Global Health Estimates Technical Paper WHO/DDI/DNA/GHE/2020.2. Geneva: WHO, 2020.
6. Naghavi M, Richards N, Chowdhury H, et al: Improving the quality of cause of death data for public health policy: are all 'garbage' codes equally problematic? BMC Medicine 2020; 18: 55.
7. Zhou M, Wang H, Zeng X, et al: Mortality, morbidity, and risk factors in China and its provinces, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet 2019; 394: 1145-1158.
8. Hong TT, Hoa NP, Walker SM, et al: Completeness and reliability of mortality data in Viet Nam: implications for the national routine health management information system. PLoS ONE 2018; 13(1): e0190755.
9. Omar A, Ganapathy SS, Anuar MFM., et al: Cause-specific mortality estimates for Malaysia in 2013: results from a national sample verification study using medical record review and verbal autopsy. BMC Public Health 2019; 110.
10. Lew B, Kölves K, Lester D, et al: Looking into recent suicide rates and trends in Malaysia: a comparative analysis. Front Psychiatry 2022; 12: 770252.
11. Rao C, Porapakkham Y, Pattaraarchachai J, et al: Verifying causes of death in Thailand: rationale and methods for empirical investigation. Popul Health Metr 2010; 8:11.
12. Snowdon J: Rates and age patterns of suicide and undetermined death in Thailand. J Psychiatry Behav Sci 2021a; 3(1): 1046.
13. Mikkelsen L, Phillips DE, AbouZahr C, et al: A global assessment of civil registration and vital statistics systems: monitoring data quality and progress. Lancet 2015; 386(10001): 1395-1406.
14. Chan CH, Caine ED, Chang SS, et al: The impact of improving suicide death classification in South Korea: a comparison with Japan and Hong Kong. PLoS ONE 2015; 10: e0125730.
15. Chang SS, Sterne JAC, Lu TH, et al: 'Hidden' suicides amongst deaths certified as undetermined intent, accident by pesticide poisoning and accident by suffocation in Taiwan. SPPE 2010; 45, 143-152.
16. Philippine Statistics Authority: Causes of deaths in the Philippines (preliminary): January to December 2020. 2021 https://psa.gov.ph/press-releases/id/164771
17. Joshi R, Hazard RH, Mahesh PKB, et al: Improving cause of death certification in the Philippines: implementation of an electronic verbal autopsy decision support tool (SmartVA auto-analyse) to aid physician diagnoses of out-of-facility deaths. BMC Public Health 2021; 563.
18. Philippine Statistics Authority: Registered deaths in the Philippines 2020, Table 9. 2022 https://psa.gov.ph/content/registered-deaths-philippines-2020
19. Lester D: The scientific study of suicide requires accurate data. Crisis 2002; 23(3): 133-134.
20. Linsley KR, Schapira K, Kelly TP: Open verdict v. suicide – importance to research. BJPsych 2001; 178: 465-468.
21. Cooper PN, Milroy CM: The coroner's system and under-reporting of suicide. Med Sci Law 1995; 35(4): 319-326.
22. Gunnell D, Bennewith O, Simkin S, et al: Time trends in coroners' use of different verdicts for possible suicides and their impact on officially reported incidence of suicide in England: 1990-2005. Psychol Med 2013; 43:1415-1422.
23. Snowdon J: Spain's suicide statistics: do we believe them? SPPE 2021b; 56(5): 721-729.
24. Snowdon J: Comparing rates and patterns of male suicide and 'hidden suicide' between nations and over time. JOMH 2021c; 17(4): 7-16.
25. Bakst SS, Braun T, Zucker I: The accuracy of suicide statistics: are true suicide deaths misclassified? SPPE 2016; 51(1): 115-123.
26. De Leo D. Dudley MJ, Aebersold CJ, et al: Achieving standardized reporting of suicide in Australia: rationale and program for change. MJA 2010; 192(8): 452-456.
27. De Leo D: Australia revises its mortality data on suicide. Crisis 2010; 31(4): 169-173, citing Australian Bureau of Statistics (2006). Causes of death, Australia, 2004. Cat. 3309.0. Canberra: ABS.
28. De Leo D: Australia revises its mortality data on suicide. Crisis 2010; 31(4): 169-173.
29. Oquendo MA, Volkow ND: Suicide: a silent contributor to opioid-overdose deaths. NEJM 2018; 378(17): 1567-1569.
30. Rockett IRH, Kapusta ND, Bhandari R: Suicide misclassification in an international context: revisitation and update. Suicidol Online 2011; 2: 48-61.
31. Snowdon J. Choi, N: Unanticipated changes in drug overdose death rates in Canada during the opioid crisis. Int J Ment Health Addict 2022.
32. World Health Organization: Suicide worldwide in 2019. 2021 https://www.who.int/publications/i/item/9789240026643

Suicide and Psychiatric Hospitalization in Taiwan

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Abstract: Mental illness is strongly associated with an increased risk of suicide. Psychiatric hospitalization provides the most intensive care for those with high suicide risk. Nevertheless, mental illness necessitating psychiatric hospitalization was strongly associated with suicide death. In contrast to the downsizing trend of psychiatric beds in the Western world, the psychiatric bed capacity in Taiwan has steadily increased in recent decades. This report aimed to address the relationship between suicide and psychiatric hospitalization concerning the trend of change in rates of inpatient and postdischarge suicide, help-seeking behaviors of suicide cases, and length of stay in relation to inpatient and postdischarge suicide in Taiwan. There is a low recognition rate of psychiatric diagnosis, mainly by nonpsychiatric physicians, among individuals who died by suicide. Despite the rate of psychiatric service contacts in the preceding year before suicide in Taiwan was comparable to that in Western countries, there was a substantially lower rate of psychiatric hospitalization in the previous year in Taiwan than in Western countries. The inpatient suicide rate in Taiwan was at the lower end of those identified in all studies worldwide and declined among psychiatric inpatients admitted from 2002 to 2013 in Taiwan. In contrast, postdischarge suicide rate was comparable to the pooled estimates of postdischarge suicide in a meta-analysis and remained stable over the study period. A longer stay in psychiatric hospitalization consistently decreases both inpatient and post-discharge suicides. These findings revealed the underdiagnosis and undertreatment of mental disorders for suicide prevention work in Taiwan. Our report underscores the proper use of psychiatric hospitalization for suicide prevention in the current context in Taiwan.

Keywords: length of stay, mental disorders, inpatient suicide, postdischarge suicide, psychiatric hospitalization, suicide risk.

(Journal of Suicidology 2022; 17(4): 337-341. DOI:10.30126/JoS.202212_17(4).0004)

Introduction

Suicide has been in the top 10 leading cause of death in Taiwan during the period from 1999 to 2009 and Taiwan was enlisted as one of the countries with high suicide risk (standardized suicide rate above 13 per 100,000) during the period of 2004–2010. Mental illness is strongly associated with an increased risk of suicide [1]. In relevant studies, approximately 90% of patients who died by suicide had a mental disorder [2], but studies on suicide in Asia revealed a lower percentage of suicide cases had diagnosable psychiatric disorders [3, 4] and only 35–40% of suicides in India and China received the diagnosis of depression [4]. Psychiatric hospitalization provides the most intensive care for those with high suicide risk. Nevertheless, mental illness necessitating psychiatric hospitalization was strongly associated with suicide death [5]. A debate has developed regarding whether psychiatric hospitalization, based on the consideration of length of stay and severity (number of hospitalizations), provides better protection or increased inpatient and post-discharge suicides [6]. The pros propose that the traumatic and distressful experiences and lack of social supports during psychiatric hospitalization may predispose those inpatients who are already vulnerable to commit suicides.

Since the 1960s, mental healthcare has gradually transformed from a hospital-based model to a community-based model. As a result of this deinstitutionalization, some Western countries face decreased psychiatric bed availability and a shortened length of stay. There have been concerns about whether these changes influence patient outcomes, including the likelihood of suicide [7-9]. In contrast to the downsizing trend of psychiatric beds influenced by the deinstitutionalization movement in the Western world, psychiatric bed capacity in some Asian countries, including Japan, South Korea, and Taiwan (Japan 269 beds, Korea 88 beds, Taiwan 91 beds per 100,000 population in 2012), have remained high or steadily increased in recent decades [10]. The total psychiatric bed capacity in Taiwan increased by 28.2% from 71 beds per 100,000 population in 2002 to 91 beds per 100,000 population in 2013 [11]. The average length of stay in psychiatric inpatient units in Taiwan also increased from 89.8 (SD, 114.0) to 96.7 (SD 117.4) days (the

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Received: 12 November 2022; **Accepted:** 30 November 2022.

median increased from 38 to 41 days), a feature similarly observed in South Korea [12].

Based on differences in the etiological role of psychiatric disorders in suicide and health care systems between Western and Asian countries, psychiatric inpatient treatment may have different implications in treating and preventing suicide. In the current study, we reported recently published studies examining the trend of change in rate and risk of inpatient suicide in Taiwan [13], help-seeking behaviors of suicide cases [13, 14], and risk factors, especially length of stay [15], associated with inpatient and postdischarge suicide in Taiwan. The implication of psychiatric hospitalization to suicide prevention was addressed.

Lower Prevalence and Low Recognition Rate of Mental Illness Among Suicide Cases in Taiwan

One review and meta-analysis examined geographical and temporal variations in the prevalence of mental disorders in suicide and found that a lower prevalence of mental illness among suicide cases in East Asia (consisting of China [mainland and Hong Kong], Japan, and Taiwan) (69.6% [95% CI = 56.8–80.0]) than in Western countries (88.2% [95% CI = 79.7–93.5]) and South Asia (90.4% [95% CI = 71.8–97.2]) [16]. One study examined healthcare service utilization 1 year before suicide in Taiwan using the National Health Insurance Database echoed the same finding [14]. A lower percentage of individuals who died by suicide was diagnosed as having psychiatric disorders in Taiwan (35.9%) than in Western countries (51.3%), especially among those with depressive disorders (10.7% vs. 42.1%) [14, 17]. For readers' discernment, suicide rates may be underestimated using the National Health Insurance database by more than 30% in Taiwan because some suicides are 'hidden' amongst deaths certified as due to other causes, e.g. undetermined intent, accident by pesticide poisoning and accident by suffocation [18]. However, one earlier study using psychological autopsy method reported 90% of patients who died by suicide had a mental disorder [19]. An epidemiological study noted a low prevalence of major depressive disorder (MDD) (1.2%) and help-seeking behaviors (one-third) despite the presence of profound functional impairment in individuals with MDD in a nationally representative sample in Taiwan [20]. The low utilization of the mental health system could contribute to the reduced detection of mental disorders [16]. MDD patients are more likely to report somatic symptoms [21] and visit medical clinics to seek help. In one study, although 99.9% of suicide cases who had contact with a psychiatrist within a month preceding death were diagnosed as having psychiatric disorders, only 19.7% of them who exclusively visited nonpsychiatric physicians received a psychiatric diagnosis of any type [22], indicating the low recognition rate of psychiatric diagnosis by nonpsychiatric physicians. Alternatively, the majority of patients who commit suicide may not communicate their intent to do so during their last appointment to medical facilities [23]. From the above observation, suicide cases with psychiatric disorders, especially MDD, are underrecognized despite they may have sought help shortly before they committed suicide.

Help-Seeking Behaviors of Suicide Patients Before Death

The percentage of individuals who died by suicide but had sought treatment for mental health in the year before death ranged from 27% [24] to 32% [25] in Western countries. Among patients who died by suicide, 18.3% [26] to 25% [27] utilized inpatient mental health care services in the year before death, and 3.7% [26] to 8.5% [5] were inpatients at the time of death in Western countries. A corresponding figure of psychiatric service contacts in the preceding year before suicide ranged from 22.2% to 29.1% [14, 22, 28] in Taiwan that was comparable to that in Western countries. Nevertheless, a substantially lower percentage of suicide victims received psychiatric inpatient treatment in Taiwan in the previous year (5.7%) [13] than did those in Western countries. And only 0.3% of suicide deaths occurred during an inpatient stay [13]. On the basis of the aforementioned findings, patients who died by suicide were not only underdiagnosed as having psychiatric disorders, but also were underutilized inpatient treatment for suicide prevention in Taiwan. Our unpublished data revealed that the percentage of schizophrenia outnumbered that of other common mental disorders that were associated with high suicide risk, i.e., schizophrenia 54.4%, mood disorders 29.4%, and alcohol or drug use disorder 2.0%, among inpatients in nationwide health insurance data in year 2012, in contrast to the corresponding figures 9.9%, 25.6%, and 19.7% in the large study in Sweden [29], implying patients with suicide risk other than severe mental disorders may be underserved by inpatient treatment in Taiwan. In accordance with the low recognition of patients with MDD, a stigmatization of and a prejudice against psychiatric hospitalization are also prevalent in our society, that result in patients who were refractory to outpatient treatment undertreatment. It has been shown that depressive symptoms in MDD and other mood disorders, in general, account for the majority of time spent ill despite availability of effective treatment [30]. Despite a substantial rate of suicide death patients who had visited psychiatric services in Taiwan, more efforts need to enhance patients' treatment adherence and compliance to intensive treatments.

Risk Factors of Inpatient and Postdischarge Suicide

Many studies have examined the possible factors associated with an increased risk of inpatient suicide and risk of suicide after discharge, including gender; age; diagnosis of affective or personality disorders; a history of /recent self-harm/suicide attempts; compulsory admission; length of stay; and a history of multiple hospitalizations. Among the studies mentioned above, some have conflicting or less consistent results. For example, various studies have found that age, number of prior hospitalizations, and length of stay have an opposite effect on inpatient or post-discharge suicides [31, 32]. Some studies found that more previous psychiatric hospitalizations were associated with a higher risk of suicide among inpatients [33] or those with a history of psychiatric hospitalization [34, 35], while others reported that patients without previous psychiatric admissions were 2.6 times more likely to

die by suicide post-discharge than those hospitalized more than three times in the preceding year [36]. While a short stay is consistently associated with increased rates of suicide among inpatients and those who have ever been hospitalized for a psychiatric diagnosis [34, 37], one meta-analysis reported that patients with longer admissions are at greater risk of inpatient suicide, which supports a dose-response relationship [32]. Instead, a short stay is generally associated with an increased likelihood of suicide post-discharge [36, 38, 39], with one exception [40]. However, other studies have reported a strong association between a long hospital stay and suicide post-discharge [41].

When studying the association between the length of stay and inpatient suicide, the confounding variable of the indication may exist; that is, the most unwell patients with the most complex needs receive the most intensive levels of treatment (i.e., psychiatric hospitalization) and, after a suicide has occurred, the hospitalization is discontinued [6]. In our recently published study using National Health Insurance databank, we demonstrated that having a higher number of previous admissions increase the risks of inpatient and post-discharge suicide [15]. A longer stay consistently decreases both inpatient and post-discharge suicides after the adjustment of risk factors including age, gender, and psychiatric diagnosis [15]. Our study provides additional evidence that suicide risk is extremely high in the first week hospitalization and hospitalization with adequate length of stay helps to reduce the suicide risk. This study suggested that medical professionals should make efforts to treat patients with high suicide risk by placing inpatient treatment timely and determine the optimal length of stay in terms of the risk of post-discharge suicide.

Trend of Change in Rates of Inpatient and Postdischarge Suicide in Taiwan

Two studies reported decreasing changes in inpatient suicide rates over time in Denmark and the United Kingdom (UK) [42, 43], while another study reported increased standardized mortality ratios for inpatient suicide over time in Israel during the same period as the two former studies [44]. Conflicting results were found and some authors have reported significant decreases in postdischarge suicide rates in Denmark and Finland [42, 45], but increased over time in the UK [43].

We extracted data on psychiatric inpatients admitted from 2002 through 2013 from the psychiatric inpatient registry of the National Health Insurance and merged then with information from the Cause of Death data by means of unique identified numbers [13]. Calendar year was fitted as a continuous variable in multivariate Poisson regression models to evaluate these rates over time. The analyses were adjusted for sex, age, primary psychiatric diagnosis, and number of admissions in the preceding year. We found that the overall inpatient suicide rate declined among psychiatric inpatients admitted from 2002 to 2013 in Taiwan [13]. This fall occurred among both genders and across all diagnostic groups. The overall rate of suicide in the 3-month postdischarge period did not show a significant change over the 12-year period, nor did it show a significant change in any subgroup. Nevertheless, the adjusted postdischarge suicide rate might have increased over the period among patients who were discharged with affective disorders.

In the same study, we found that the inpatient suicide rate (81 per 100,000 person-years) in Taiwan was at the lower end of those identified in all studies (1st quartile 98 per 100,000 person-years) in a meta-analysis of suicide rates among psychiatric inpatients [8] but postdischarge suicide rate was comparable (1108 per 100,000 person-years) to the pooled estimates of postdischarge suicide (1,132 per 100,000 person-years, 95% CI: 874-1467) in another meta-analysis [46]. Our inpatient suicide rate was also much lower than that of Denmark (1,067 per 100,000 person-years) and England (588 per 100,000 person-years) [42, 43]. Notably, the number and proportion of general suicide patients who died as psychiatric inpatients was very low (n = 192, 0.4 %) in our data compared to that of Denmark (6%) [34] and the UK (16%) [47]. Despite the great accessibility to psychiatric inpatient care and medical application of medical expense waivers for catastrophic illnesses (e.g., psychosis and severe affective disorders) covered by the NHI, one seemingly contradictory reason responsible for the low inpatient suicide rate might be related to the low hospitalization rate among individuals with completed suicide in Taiwan.

In summary, suicide victims in Taiwan have a comparable rate of contact for mental health services (psychiatrists) but a lower rate of utilizing inpatient mental health care services in the year before death despite psychiatric bed capacity is comparatively adequate in Taiwan. Suicide cases had a lower rate of being diagnosed as mental disorder, especially MDD, before death. A longer stay consistently decreases both inpatient and post-discharge suicides. These findings suggest that accurate diagnosis and adequate treatment of mental disorders are important for suicide prevention. We also underscore the importance of placing patients with mental disorders in inpatient treatment with adequate length of stay in the role of suicide prevention.

Conflict of Interest.

None.

Financial Support.

This study was supported by a grant from Taipei Medical University (TMU111-AE1-B01).

References

1. Fu XL, Qian Y, Jin XH, et al: Suicide rates among people with serious mental illness: a systematic review and meta-analysis. Psychol Med 2021:1-11.
2. Cavanagh JT, Carson AJ, Sharpe M, et al: Psychological autopsy studies of suicide: a systematic review. Psychol Med 2003;33(3):395-405.
3. Phillips MR: Rethinking the role of mental illness in suicide. Am J Psychiatry 2010;167(7):731-733.
4. Vijayakumar L: Suicide and mental disorders in Asia. Int Rev Psychiatry 2005;17(2):109-114.
5. Mortensen PB, Agerbo E, Erikson T, et al: Psychiatric illness and risk factors for suicide in Denmark. The Lancet 2000;355(9197):9-12.

6. Large MM, Kapur N: Psychiatric hospitalisation and the risk of suicide. Br J Psychiatry 2018;212(5):269-273.
7. Wahlbeck K, Westman J, Nordentoft M, et al: Outcomes of Nordic mental health systems: life expectancy of patients with mental disorders. Br J Psychiatry 2011;199(6):453-458.
8. Walsh G, Sara G, Ryan CJ, et al: Meta-analysis of suicide rates among psychiatric in-patients. Acta Psychiatr Scand 2015;131(3):174-184.
9. Hansen V, Jacobsen BK, Arnesen E: Cause-specific mortality in psychiatric patients after deinstitutionalisation. Br J Psychiatry 2001;179(5):438-443.
10. OECD. Hospital Beds (indicator). 2021 https://data.oecd.org/healtheqt/hospital-beds.htm.
11. Ministry of Health and Welfare. Table 4 Number of beds in hospitals and clinics per 10000 population, 1999-2013. 2017 https://www.mohw.gov.tw/cp-3304-31331-2.html.
12. OECD. Advancing the organisation, payment and integration of care for people with severe mental illness. Paris: OECD. 2014 https://www.oecd-ilibrary.org/content/publication/9789264208445-en.
13. Tseng MM, Chang CH, Liao SC, et al: Rates and trends of psychiatric inpatient and postdischarge suicides in Taiwan, 2002-2013: a national register-based study. Soc Psychiatry Psychiatr Epidemiol 2019;54(5):591-598.
14. Chang CM, Liao SC, Chiang HC, et al: Gender differences in healthcare service utilisation 1 year before suicide: national record linkage study. Br J Psychiatry 2009;195(5):459-460.
15. Tseng MM, Chang CH, Liao SC, et al: Length of stay in relation to the risk of inpatient and post-discharge suicides: a national health insurance claim data study. J Affect Disord 2020;266(2):528-533.
16. Cho SE, Na KS, Cho SJ, et al: Geographical and temporal variations in the prevalence of mental disorders in suicide: systematic review and meta-analysis. J Affect Disord 2016;190(1):704-713.
17. Yeh HH, Westphal J, Hu Y, et al: Diagnosed mental health conditions and risk of suicide mortality. Psychiatr Serv 2019;70(9):750-757.
18. Chang S-S, Sterne JC, Lu T-H, et al: 'Hidden' suicides amongst deaths certified as undetermined intent, accident by pesticide poisoning and accident by suffocation in Taiwan. Soc Psychiatry Psychiatr Epidemiol 2010;45(2):143-152.
19. Cheng ATA: Mental illness and suicide: a case-control study in East Taiwan. Arch Gen Psychiatry 1995;52(7):594-603.
20. Liao SC, Chen WJ, Lee MB, et al: Low prevalence of major depressive disorder in Taiwanese adults: possible explanations and implications. Psychol Med 2012;42(6):1227-1237.
21. Yoshimasu K, Kondo T, Tokunaga S, et al: Mental and somatic symptoms related to suicidal ideation in patients visiting a psychosomatic clinic in Japan. Int J Gen Med 2009;2:163-170.
22. Pan YJ, Lee MB, Chiang HC, et al: The recognition of diagnosable psychiatric disorders in suicide cases' last medical contacts. Gen Hosp Psychiatry 2009;31(2):181-184.
23. Isometsä ET, Heikkinen ME, Marttunen MJ, et al: The last appointment before suicide: is suicide intent communicated? Am. J. Psychiatry 1995;152(6):919-922.
24. University of Manchester. National confidential inquiry into suicide and safety in mental health. Annual report: England, Northern Ireland, Scotland and Wales.; 2021 13 May 2021. https://www.hqip.org.uk/resource/suicide-safety-mental-health-report-2020/#.YKNtbHnitPY
25. Luoma JB, Martin CE, Pearson JL: Contact with mental health and primary care providers before suicide: a review of the evidence. Am J Psychiatry 2002;159(6):909-916.
26. Walby FA, Myhre MO, Kildahl AT: Contact with mental health services prior to suicide: a systematic review and meta-analysis. Psychiatr Serv 2018;69(7):751-759.
27. Reutfors J, Brandt L, Ekbom A, et al: Suicide and hospitalization for mental disorders in Sweden: a population-based case-control study. J Psychiatr Res 2010;44(12):741-747.
28. Lee HC, Lin HC, Liu TC, et al: Contact of mental and nonmental health care providers prior to suicide in Taiwan: a population-based study. Can J Psychiatry 2008;53(6):377-383.
29. Haglund A, Lysell H, Larsson H, et al: Suicide immediately after discharge from psychiatric inpatient care: a cohort study of nearly 2.9 million discharges. J Clin Psychiatry 2019;80(2):18m12172.
30. Forte A, Baldessarini RJ, Tondo L, et al: Long-term morbidity in bipolar-I, bipolar-II, and unipolar major depressive disorders. J Affect Disord 2015;178(1):71-78.
31. Large M, Sharma S, Cannon E, et al: Risk factors for suicide within a year of discharge from psychiatric hospital: a systematic meta-analysis. Aust N Z J Psychiatry 2011;45(8):619-628.
32. Large M, Smith G, Sharma S, et al: Systematic review and meta-analysis of the clinical factors associated with the suicide of psychiatric in-patients. Acta Psychiatr Scand 2011;124(1):18-29.
33. Levi L, Werbeloff N, Pugachova I, et al: Has deinstitutionalization affected inpatient suicide? Psychiatric inpatient suicide rates between 1990 and 2013 in Israel. Schizophr Res 2016;173(1-2):75-78.
34. Qin P, Nordentoft M: Suicide risk in relation to psychiatric hospitalization: evidence based on longitudinal registers. Arch Gen Psychiatry 2005;62(4):427-432.
35. Winkler P, Mladá K, Csémy L, et al: Suicides following inpatient psychiatric hospitalization: A nationwide case control study. J Affect Disord 2015;184(3):164-169.
36. Lee HC, Lin HC: Are psychiatrist characteristics associated with postdischarge suicide of schizophrenia patients? Schizophr Bull 2009;35(4):760-765.
37. Hunt IM, Kapur N, Webb R, et al: Suicide in current psychiatric in-patients: a case-control study the national confidential inquiry into suicide and homicide. Psychol Med 2007;37(6):831-837.
38. Desai RA, Dausey DJ, Rosenheck RA: Mental health service delivery and suicide risk: the role of individual patient and facility factors. Am J Psychiatry 2005;162(2):311-318.

39. Troister T, Links PS, Cutcliffe J: Review of predictors of suicide within 1 year of discharge from a psychiatric hospital. Curr Psychiatry Rep 2008;10(1):60-65.
40. Ho T-P: Duration of hospitalization and post discharge suicide. Suicide Life Threat Behav 2006;36(6):682-686.
41. Park S, Choi JW, Kyoung Yi K, et al: Suicide mortality and risk factors in the 12 months after discharge from psychiatric inpatient care in Korea: 1989-2006. Psychiatry Res 2013;208(2):145-150.
42. Madsen T, Nordentoft M: Changes in inpatient and postdischarge suicide rates in a nationwide cohort of Danish psychiatric inpatients, 1998-2005. J Clin Psychiatry 2013;74(12):1190-1194.
43. Kapur N, Hunt IM, Windfuhr K, et al: Psychiatric in-patient care and suicide in England, 1997 to 2008: a longitudinal study. Psychol Med 2013;43(1):61-71.
44. Goldberge N, Haklai Z, Pugachova I, et al: Suicides among persons with psychiatric hospitalizations. Isr J Psychiatry Relat Sci 2015;52(1):25-32.
45. Pirkola S, Sohlman B, Heila H, et al: Reductions in postdischarge suicide after deinstitutionalization and decentralization: a nationwide register study in Finland. Psychiatr Serv 2007;58(2):221-226.
46. Chung D, Hadzi-Pavlovic D, Wang M, et al: Meta-analysis of suicide rates in the first week and the first month after psychiatric hospitalisation. BMJ open 2019;9(3):e023883.
47. Appleby L, Shaw J, Amos T, et al: Suicide within 12 months of contact with mental health services: national clinical survey. BMJ 1999;318(7193):1235-1239.

Original Articles

Identification of Suicidality by Five-Item Suicide Crisis Scale (SCS-5) in an Online General Population Survey in Taiwan

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Abstract: ***Background:*** Suicide crisis syndrome (SCS) was defined as a pre-suicidal mental condition comprising five components of affective disturbances, loss of cognitive control, hyperarousal, social withdrawal and entrapment. A revised Suicide Crisis Inventory (SCI-2) for assessing SCS has been validated to identify recent week suicidal ideation (SI) in Taiwan. The study aimed to develop and validate a shorter form of SCI-2 named five-item suicide crisis scale (SCS-5) to detect SCS and suicidality.***Method:*** An anonymous online questionnaire survey was conducted on psychopathology and associated suicide risks among community residents. The participants were enrolled online and completed the survey questions including demographics, SCI-2, 5-item Brief Symptom Rating Scale (BSRS-5) and Suicide Narrative Inventory (SNI) to measure psychological distress as well as suicidality (i.e., SI and attempts). The SCS-5 contained five items derived from the SCI-2; each item had the highest correlation with the corresponding subscale of SCI-2. The factor structure and validity of the SCS-5 were examined using confirmatory factor analyses (CFA) and correlations with the SCI-2, BSRS-5, SNI and suicidality. Stepwise multiple regression and receiver operating characteristic (ROC) curve were performed to predict suicidal ideation.***Results:*** A total of 4846 participants were eligible for analysis. Results of the one-factor CFA for SCS-5 indicated a good model fit. The SCS-5 demonstrated excellent internal consistency (Cronbach alpha: .92) and good correlations with all items of the BSRS-5, SNI and suicidality measures. Regression analysis revealed that all SCS-5 items significantly explained 28.0% of the variance of one-week SI. ROC curve indicated that the optimal cut-off (4/5) of the SCS-5 could significantly differentiate the one-week SI. ***Conclusion:*** The study revealed that the SCS-5 performed satisfactory psychometric properties to identify recent SI among the general adult population in Taiwan. Its predictive validity for future suicide behaviors in different clinical settings needs further investigation.

Keywords: suicide crisis syndrome, Five-item Suicide Crisis Scale (SCS-5), revised Suicide Crisis Inventory (SCI-2), Suicide Narrative Inventory (SNI), near-term suicide risk, psychological distress, BSRS-5.

(Journal of Suicidology 2022; 17(4): 342-351. DOI:10.30126/JoS.202212_17(4).0003)

Introduction

Suicide is a worldwide issue and becomes a great concern in the post- COVID-19 era [1]. Suicidality consists of a continuum ranging from suicidal ideation (SI), planning, suicide attempt (SA), to completed suicide. In Taiwan, suicide became one of the top-ten leading causes of death in 1997. In response, the Taiwan government initiated a National Suicide Prevention Project to promote national suicide prevention strategies. Under the project, a National Suicide Surveillance System (NSSS) was launched in 2006 to register and offer follow-up care for suicide attempters nationwide. The NSSS data indicated that the structured program of the NSSS decreased suicides and delayed time to death for those who remained susceptible to suicide [2]. Moreover, the levels of psychological distress by BSRS-5 at index episode could significantly predict future non-fatal suicide attempts and fatal deaths by suicide within one year [3]. According to the data of 2021 [4], less than 30 % (28.15%) of the suicidal decedents had been reported to the system for further care. Therefore, early identification of SI before attempt and its associated imminent risk factors become more critical to prevent SA.

Among the wide range of risk factors, mental distress resulting from psychiatric disorders and psychosocial stress are the core risks [5-9]. The majority of suicide risk assessments pay significant attention to long-term factors; however, individuals may conceal or deny suicidality in health service settings [10,11]. Thus, early identification of pre-suicidal mental state (e.g., suicide crisis syndrome, SCS) was proposed as potential formal psychiatric diagnosis other than suicide behavior

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Received: 7 November 2022; **Accepted:** 25 November 2022.

disorder to tentatively be used in the DSM [12]. The SCS intends to determine near-term risks for suicide without mention of suicidality. The SCS could predict short-term SA among high-risk sub-groups (e.g., at follow-up period after discharge for those hospitalized for SI or SA [13-16]. The current SCS comprised five dimensions: entrapment, affective disturbance, loss of cognitive control, hyperarousal, and social withdrawal [17,18]. Accordingly, the Suicide Crisis Inventory was renewed (SCI-2) to better reflect the current SCS formulation [19]. The SCI-2 was expected to help health professionals identify individuals in suicide crises. The previous study has validated the Taiwanese version of the SCI-2 for detecting suicidality among community residents [20]. The present study aimed to develop a shorter form of the 61-item SCI-2 as a screener for use in clinical or community settings. According to the previous reports on psychometric properties of SCI-2, we hypothesized that the SCS-5 would fit the one-factor structure as the SCI-2 with good internal consistency [17, 20, 21, 22,]

Methods

Participants and procedures

The study was part of the International Suicide Prevention Assessment Research for COVID-19 (I-SPARC), investigating pre-suicide near-term mental states and associated risks under COVID-19 across 13 countries. The online survey in Taiwan was performed by the Taiwanese Society of Suicidology (TSOS) between 7th April and 4th May, 2021. This cross-sectional study used a convenience sample volunteering to participate online. Its detailed methods were reported in previous articles [22, 23].

Social media users such as Facebook and LINE who were aged over 20 were invited to take part in this project. In total, 4846 participants who completed the survey questions were included in the analysis for this study. The ethical approval was obtained from the Institutional Review Board at the corresponding author's affiliated university hospital (202101118W). All participants provided informed consent on the first page of the survey.

Measures

All the survey items of the I-SPARC were translated into Chinese and established on Qualtrics website.

The 2nd version of the Suicide Crisis Inventory (SCI-2)

The Suicide Crisis Inventory version 2 (SCI-2) is a 61-item self-rating scale used to measure near-term suicide risk (Barzilay et al., 2020) [17]. It comprises five subscales: entrapment (10 items), affective disturbance (17 items), loss of cognitive control (15 items), hyperarousal (13 items), and social withdrawal (6 items). Each item was rated by respondents on a five-point scale based on how they felt over the last several days when they felt the worst: 0, not at all; 1, a little; 2, somewhat; 3, quite a bit; 4, extremely. The total and subscale scores were used to test its internal consistency and convergent validity. The reliability and validity of the Chinese version of the SCI-2 have been validated in our previous report [20]. Internal consistencies of the SCI-2 total score and its proposed subscales were all good to high in this study: total score (α = .98), entrapment (α = .96), affective disturbances (α = .91), loss of cognitive control (α =.82), hyperarousal (α =.94), and social withdrawal (α = 0.93).

Five-Item Brief Symptom Rating Scale (BSRS-5)

The BSRS-5 is a self-report scale with a satisfactory validity to assess mental distress and suicidality in both clinical and community settings [24-27]. The BSRS-5 measures the following five items of psychological distress levels: (1) insomnia; (2) anxiety; (3) hostility; 4) depression; (5) inferiority. Participants were asked to rate the level caused by each item during the past week: 0, not at all; 1, a little bit; 2, moderately; 3, quite a bit; 4, extremely. An item of SI with the same rating method was added to the end of the above scale rated by the above 5-point Likert measures (0-4 scores). The score of each item and a total score of item 1-5 in the BSRS-5 were used for analysis, in which total score of the first five items ranges from 0-20. The cut-off point was 5/6 to assess mental distress above the symptomatic threshold. Besides, the level of SI in the past week over 2 points was regarded as severe distress. The internal consistency of the BSRS-5 in this study was .863, showing high reliability of the scale.

Suicide Narrative Inventory (SNI)

The SNI contains 38 items measuring the following eight subscales: (1) thwarted belongingness, (2) perceived burdensomeness, (3) fear of humiliation, (4) defeat, (5) goal reengagement, (6) goal disengagement, (7) entrapment, and (8) perfectionism [28,29]. Each item was self-rated on a five-point Likert scale, based on how the respondents viewed themselves over the last month, ranging from 1 to 5, with 1 being not true at all, and 5 being extremely true. The 8 subscale scores and a total score of the SNI were used for analysis in the study. The psychometric properties of the SNI were satisfactory in terms of factor structure, internal consistency, and convergent validity with SCI-2, BSRS-5, and suicide assessment in Taiwan [23].

Development of the SCS-5

The SCS-5 contains five items derived from the SCI-2 (see Appendix 1) with the same rating instruction and method; each item selected from each subscale of the SCI-2 had the highest correlation with the corresponding subscale score. If two items meet the criteria for the subscale, the associated figures of better factor loadings and wording clarity were taken into consideration as selection reference.

Suicidality assessment

The suicidality battery includes past week SI (the 6th item of the BSRS) assessment and four yes/no questions to assess specific suicide risks, i.e., whether

the participant had suicide attempt(s) or serious SI in the past month and lifetime, respectively? The self-reported responses reflected different levels of suicide risks.

Statistical analysis

The factor structure of the SCS-5 was examined using confirmatory factor analysis (CFAs) after good performance of the Kaiser-Meyer-Olkin (KMO) for sampling adequacy [30] and Bartlett's test of sphericity [31] for suitability. In the one-factor model of the SCS-5, the model fit was evaluated by recommended guidelines (Hu & Bentler, 1999) [32], including the chi-square statistic ($\chi 2$), comparative fit index (CFI), root mean squared error of approximation (RMSEA), and standardized root mean residual (SRMR). Specifically, good model fit was indicated by a non-significant $\chi 2$ statistic, CFI ≥ .95, RMSEA ≤ .08, and SRMR ≤ .08.

Internal consistency of the SCS-5 was assessed using Cronbach's alpha. Convergent validity was examined by Pearson's correlations between the SCS-5 scores and other measures such as SCI-2, BSRS-5, SNI, and suicidality measures. Further, stepwise multiple regression was used to estimate the association of individual item of SCS-5 with one-week SI. The ROC curve analysis was performed to determine the optimal cut-off point of the SCS-5 to identify the recent one-week SI. The Statistical significance was set at a level of p = .05. Missing data were handled using listwise deletion, leaving the total sample size of this study. The SAS 9.4 software package (SPSS, Chicago, IL) was used for analyses in this study.

Results

Demographics and correlation of the SCS-5 with the SCI-2

The demographics and basic data were presented in our previous papers [22, 23]. In short, of the 4,846 participants, the females predominated the sample (82.6%) with a mean age of 37.5 ± 10.8, over half were married (54.8%), and two-thirds were graduates. The results revealed that among the total participants, each item of SCS-5 presented with a significantly high correlation with the total score of and each corresponding subscale of the SCI-2. In addition, each SCS-5 item had a high factor loading with one-factor model or corresponding construct of five-factor model of the SCI-2 (Table 1).

Table 1. The correlations between individual items of Five-item Suicide Crisis Scale (SCS-5). and subscales of original Suicide Crisis Inventory (SCI-2).

SCS-5 items	Total SCI-2	SCI-2 one-factor model loadings	SCI-2 five-factor model loadings	SCI-2 corresponding subscale
S1. Loss of cognitive control (power less to stop upset ting thoughts)	.87**	.95	.96	.86**
S2. Affective distur bances (unbearable emotional pain)	.85**	.93	.94	.86**
S3. Entrapment (no escape)	.86**	.93	.95	.88**
S4. Hyperarousal (emo tional turmoil)	.85**	.90	.94	.85**
S5. Social withdrawal (isolated from others)	.78**	.85	.96	.88**

Note: ** p <.01.

Factor structure of the SCS-5

Both the KMO statistics (.90) and Bartlett's test of sphericity ($\chi 2[1830] = 18924.85$, $p < .001$) indicated that there were sufficient significant correlations in the data for its use in factor analysis. Results of the one-factor CFA of SCS-5 had good model fit ($\chi 2[5]=28.497$, $p<.001$, CFI=.99, TLI=.99, RMSEA=.08, SRMR = .01). Standardized factor loadings of SCS-5 items were distributed as follows: loss of cognitive control (.90), affective disturbances (.88), entrapment (.88), hyperarousal (.84) and social withdrawal (.73). All items loaded significantly onto the one-factor and explained 77.24% of the variance of SCS-5.

Reliability and validity of the SCS-5

As shown in Table 2, all individual SCS-5 items had high correlations with SCS-5 total (r = .78-.86) as well as good inter-item correlations (r=.63-.81). The internal consistency of the SCS-5 was excellent (α=.92). Concerning the convergent validity (Table 3), the SCS-5 had strong positive correlations with SCI-2 (r=.96), BSRS-5 (r=.64), SNI (r=.64) and one-week SI (r=.51); moderate correlations (r=.24-.39) with other suicide-related variables (i.e., SI in past month, SI in lifetime, and SA in lifetime). All correlations reached a significant level. Concerning associations between the individual items of SCS-5 and suicidality (Table 4), all individual items had significant associations with various indices and timeframes of suicidality. A strong correlation was noted for past-week SI, followed by moderate correlations for SI in past month and lifetime. For instance, regarding one-week SI, affective disturbance (r = .51) had the highest coefficient, followed by entrapment (r = .45), hyperarousal (r = .45), loss of cognitive control (r = .44) and social withdrawal (r = .40). Furthermore, these five imminent pre-suicide mental conditions had moderate to high associations with all five BSRS-5 items (Table 5), with the highest coefficient for depression (r=,50 -.55). Concerning the association with SNI, it was evident that all items had good correlations (r=.54-.58) with social defeat and entrapment as well as moderate correlations with the other SNI subscales (Table 6). The findings indicated that there were close links among the pre-suicidal mental states in several days (SCS-5), psychological distress in recent week and suicide narratives in past month. It implied that the SCS-5 had a good convergent validity with the BSRS-5, SCI-2, SNI and suicidality of various durations.

Table 2. The inter-item correlations of the Five-item Suicide Crisis Scale.

	S1	S2	S3	S4	S5
S1	1				
S2	.81**	1			
S3	.80**	.78**	1		
S4	.75**	.72**	.73**	1	
S5	.63**	.63**	.65**	.64**	1
SCS-5 total	.86**	.86**	.86**	.85**	.78**

Note: 1. ** p <.01; Cronbach alpha of SCS-5: .92.
2. S1: Loss of cognitive control; S2: Affective disturbances; S3: Entrapment; S4: Hyperarousal; S5: Social withdrawal.

Table 3. Correlations between Five-item Suicide Crisis Scale and ther scales.

	SCS-5	SCI-2	BSRS-5	SNI
SCI-2	.96**	1		
BSRS-5	.64**	.69**	1	
SNI	.64**	.66**	.58**	1
One-week SI	.51**	.55**	.52**	.44**
Past month SI	.39**	.40**	.30**	.32**
Past month SA	.25**	.27**	.19**	.19**
Lifetime SI	.31**	.33**	.29**	.30**
Lifetime SA	.24**	.27**	.22**	.26**

Note: ** p < .01; SI=suicidal ideation; SA: suicide attempt.

Table 4. Correlations between Five-item Suicide Crisis Scale total/item scores and suicidality.

	One-week SI	Past month SI	Past month SA	Lifetime SI	Lifetime SA
Loss of cognitive control	.44**	.33**	.21**	.27**	.21**
Affective disturbance	.51**	.37**	.26**	.25**	.22**
Entrapment	.45**	.35**	.23**	.27**	.22**
Hyperarousal	.45**	.35**	.23**	.28**	.21**
Social withdrawal	.40**	.30**	.18**	.28**	.21**

Note: ** p < .01; SI=suicidal ideation; SA= suicide attempt.

Table 5. Pearson's correlations of item scores between Five-item Suicide Crisis Scale and 5-item Brief Symptom Rating Scale (BSRS-5).

	Insomnia	Anxiety	Hostility	Depression	Inferiority
S1	.366**	.473**	.461**	.543**	.466**
S2	.358**	.456**	.463**	.550**	.453**
S3	.349**	.464**	.462**	.531**	.466**
S4	.379**	.480**	.495**	.545**	.438**
S5	.323**	.412**	.451**	.496**	.447**

Note: ** p < .01; S1: Loss of cognitive control; S2: Affective disturbances; S3: Entrapment; S4: Hyperarousal; S5: Social withdrawal.

Table 6. The correlations of subscale scores between Five-item Suicide Crisis Scale and Suicide Narrative Inventory (SNI).

	Thwarted be-longing-ness	Perceived bur-denso-meness	Fear of humil-iati-on	Defeat	Goal reen-gage-ment	Entrapm-ent	Perfectio-nism
S1	.48**	.48**	.35**	.57**	-.04*	.56**	.24**
S2	.48**	.51**	.30**	.57**	-.08**	.54**	.20**
S3	.50**	.49**	.35**	.58**	-.03	.58**	.23**
S4	.48*	.46**	.35**	.55**	-.01	.54**	.24**
S5	.52**	.49**	.38**	.56**	-.01	.56**	.22**

Note: *p<0.5; **p<0.01; S1: Loss of cognitive control; S2: Affective disturbances; S3: Entrapment; S4: Hyperarousal; S5: Social withdrawal.

As mentioned above, the SCS-5 had high inter-item correlations; further stepwise multiple regression was performed on 1-week SI by SCS-5 items. The results (Table 7) indicated that affective disturbance had the highest coefficient (.34) and together with the remaining items explained 28.0% of the variance of one-week SI. Moreover, combination of BSRS-5 and SCS-5 could explain 32% of variance of one-week SI. Considering the SCS-5 as a screener for one-week SI, a score of 4/5 was determined as the optimal cut-off by ROC curve. As displayed in Figure 1, using this cutoff, the rate of accurate classification for past-week SI was 85.39% (with sensitivity=0.74, specificity=0.80, negative predictive value [NPV] =.90, and positive predictive value [PPV] = .55). The area under curve (AUC) was .84 (95% confidence interval, .82-.83). The NPV of .90 implied that when the respondent scored less than 5, there was a 90% probability that he or she would not have SI.

Table 7. Multivariate regression analysis on suicidal ideation by SCS-5 items.

	Variables	B	Std. error	p-value	Standardized coefficients	R^2
Model 1	Affective disturbances	.211	.015	<.001	.336	.257
	Hyperarousal	.081	.011	<.001	.146	.274
	Social withdrawal	.043	.009	<.001	.083	.278
	Entrapment	.040	.013	<.05	.069	.279
	Loss of cognitive control	-.028	.014	.05	-.048	.280
Model 2						
	BSRS-5	.048	.002	<.001	.322	.269
	SCS-5	.040	.002	<.001	.306	.32

Note: SCS-5: Five-item Suicide Crisis Scale.

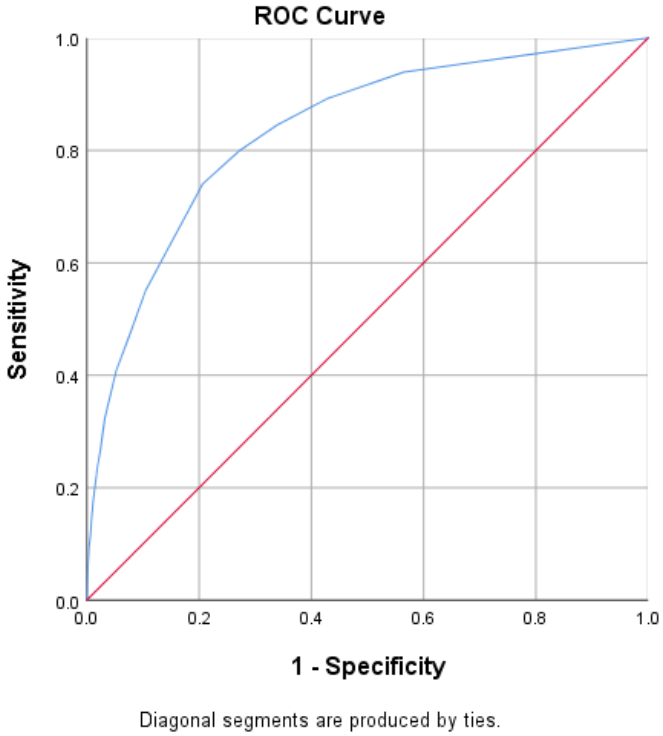

Figure 1. The sensitivity and specificity of SCS-5 to determine the one-week suicidal ideation by ROC curve with the area under curve (AUC=.84, optimal cutoff=5.0, sensitivity=.74, and specificity=.80).

Discussion

The present study aimed to test the validity of the SCS-5 used in the Taiwanese adult population. Consistent with our hypotheses, we found that the SCS-5 had a one-factor model with a good fit to determine recent SI. Similar to the parent SCI-2 measure, the SCS-5 performed satisfactorily in terms of its psychometric properties, with excellent internal consistency as well as significant convergent validity with the related constructs (i.e., BSRS-5, SNI, lifetime SA, and SI in 1-week/1-month and lifetime) in the study. The finding supported that the SCS was a syndrome entity with five cardinal components [20, 33] and could be triaged based on the distress levels by SCS-5 scoring (0-20). It also provided an important basis to use SCS-5 as a suicide risk screener in Taiwan. In consistence with our previous findings on the validity of the SCI-2, the SCS-5 demonstrated that pre-suicidal mental conditions were significantly associated with various near-term psychological distress (one-month SNI and one-week BSRS-5) and a battery of suicidality in different time frame.

The study indicated that all the individual item symptoms were highly inter-correlated. It was evident that loss of cognitive control (powerless to stop upsetting thoughts), entrapment (no escape), and affective disturbance (emotional pain) had the highest correlation with other items and total SCS-5 scale (Table 2) as well as highest factor loadings to one-factor of SCS-5. It implied that these three symptom items played a central role in SCS for the community population. This finding was similar to the report by Bloch-Elkouby et al (2020) [34]; they used network analysis on the symptom scores of the SCS in 500 outpatients and 223 inpatients and found that the above-mentioned entrapment, ruminative flooding (powerless to stop upsetting thoughts) and emotional pain were major criteria of the SCS [34].

Regarding the relationship between individual SCS-5 item and one-week SI, the regression analysis (Table 7) revealed that all five items of the SCS-5 were significantly correlated with one-week SI; affective disturbance (unbearable emotional pain) (r = .336) and hyperarousal (emotional turmoil) (r =.146) were the top two predictors. It implicated that emotional pain and emotional turmoil were the core of the SCS contributing to SI in the study. Emotional pain is an unpleasant suffering of a psychological origin. It was described by Edwin S. Shneidman as "how much you hurt as a human being and was considered one of the common characteristics of suicide [35]. Other descriptions of emotional pain included "subjective experiences of negative changes in the self and in its functions accompanied by negative feelings" and "a lasting, unsustainable, and unpleasant feeling resulting from negative appraisal of an inability or deficiency of the self". The emotional pain was also considered as the basic component of the “Three Step Theory of Suicide” [36]. In the present study, the emotional pain (item S2 in Table 5) had significant correlations with all BSRS-5 items (e.g., highest coefficient with depression). Emotional turmoil indicates another type of negative feelings such as confusion, panic and agitation. People experiencing emotional turmoil may have difficulty making decisions, sleep disturbances and constant anxiety. In the study, emotional turmoil in hyperarousal (item S4 in Table 5) presented the highest correlation with depression (.55), followed by hostility (.50), anxiety (.48) and insomnia (.38). Thus, it covered an anxiety spectrum. These two factors worked together with the remaining three item distress leading to SI. Similar to the findings reported by Lee et al (2010, recent mental distress measured by BSRS-5 in the general population in Taiwan was significantly associated with the recent SI [37]. In the study, the SCS-5 also demonstrated its high correlation with BSRS-5 (r=.64) and they presented a similar correlation coefficient (above .50) with one-week SI. Further, BSRS-5 and SCS-5 could synergize to increase the predictability to one-week SI (Table 7). In the study, we used one-week SI (not severe like SA) as an outcome variable such that entrapment, loss of cognitive control and social withdrawal did not become the prominent factors. That means the independent items might interact and play different weights and role to cause suicidality such as suicidal behaviors.

According to the Narrative-Crisis Model (NCM), the suicidal crisis resulted from the interactions of trait vulnerability, suicidal narrative, and the negative mental state of SCS [12, 20, 21]. Previous studies have indicated that cognitive suicidal narratives had significantly positive association with the imminent risk of suicidality [12, 14, 23]. The present study confirmed this association; all individual SCS-5 items had a significant correlation with past-month SNI (total and all subscales), in particular, high coefficients (.56-.68) for social defeat and entrapment.

In busy clinical settings treating patients with severe physical conditions or in a large community survey, the SCS-5 might represent an effective and convenient alternative to existing suicide risk assessment methods. Other than the total scale score, the scoring of each SCS-5 item could quickly and easily provide information about specific components of pre-suicide mental distress. Therefore, the use of SCS-5 total score as a continuous measure may not only help health professionals triage suicidal severity to determine those in need of crisis interventions, but also provide key insights into the underlying nature and extent of a suicidal crisis based on the profile of individual item score.

Furthermore, regarding the indication of combined use of various assessment for suicide risk, Rogers et al (2022) have reported that the SCS assessment alongside SI was incrementally informative in detecting individuals at risk of future suicide behavior [15]. Therefore, combination of brief scales such as BSRS-5, SCS-5 and SI might increase the probability to identify the individuals at risk. In Taiwan, Wu et al (2020) [3] conducted a cohort study on suicide attempters across ten years and found that the incidence of further fatal re-attempts within one year could be significantly predicted by general psychological distress and individual symptom distress levels measured by BSRS-5 at the index attempt (i.e., SI, adjusted hazard ratio, aHR=.24; depression, aHR=2.77; inferiority, 2.51; anxiety, 2.45; hostility, 2.23; and insomnia, 2.13). Specifically, single item of SI presented a higher aHR than BSRS-5 total (aHR=1.75). So, it is worth tesingt if adding the SCS-

5 into our current use of BSRS-5 with item of SI in the nationwide aftercare program for suicide attempters can increase the predictability for future suicide and achieve a better outcome of prevention strategy.

Limitations

The study results, derived from the online survey on those who have easy website access and higher motivations to join online surveys, could lead to information bias regarding the reliability of the data. Besides, the generalizability should be cautious in terms of the sociodemographic characteristics with mostly female and well-educated participants. Future studies should be conducted among diverse populations (e.g., clinical or high-risk groups) to ensure the generalizability of the SCI-5 used in different contexts. The study was cross-sectional in nature and hence, no conclusion can be drawn about the predictive validity of the SCI-5 for subsequent attempts; however, the findings provide an important basis for subsequent examination of the predictive validity of the tool. Future studies of the SCI-5 are also suggested to recruit wider demographic populations of males and average educational backgrounds.

Conclusions

The SCS-5 was highly correlated with SCI-2, BSRS-5, SNI and a battery of suicidality and could be used as a measure for suicide crisis syndrome. Despite the limitations, the study indicated that the SCS-5 performed good psychometric properties as SCI-2 with a good model fit. Our findings provide a basis for the use of SCS-5 as a screening tool for suicide risk assessment in Taiwan. Although the SCS-5 in the study could identify significantly the recent one-week SI for community residents, future studies are needed to test its predictive validity in predicting near-term suicidal behavior among the high-risk sub-groups or those of males and average educational backgrounds. This is crucial to help improve future risk assessment and crisis management strategies.

Acknowledgments

The authors would like to thank all the colleagues at the Taiwan Suicide Prevention Center for statistical assistance and administrative help. We are also grateful to all the participants for their voluntary and enthusiastic support of this online survey.

Competing interests

The authors declare that they have no conflict of interest.

References

1. World Health Organization: Suicide facts. 2021 https://www.who.int/news-room/fact-sheets/detail/suicide
2. Pan YJ, Chang WH, Lee MB: Effectiveness of a nationwide aftercare program for suicide attempters. Psychol Med 2013;4:1447-1454.
3. Wu CY, Lee MB, Liao SC, et al: Psychological distress of suicide attempters predicts one-year suicidal deaths during 2007-2016: a population-based study. J Formos Med Assoc 2020;119(8):1306-1313.
4. Taiwan Suicide Prevention Center: Annual Report of Taiwan Suicide Prevention Project 2022. Taipei, Taiwan.
5. Mann JJ, Apter A, Bertolote J, et al: Suicide prevention strategies. JAMA 2005;294:2064-2074.
6. Kessler RC, Borges G, Walters EE: Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. Arch Gen Psychiatry 1999;56:617-626.
7. Bachmann S: Epidemiology of suicide and the psychiatric perspective. Int J Environ Res Publ Health 2018;15(7):1425.
8. Chang HJ, Yang CY, Lin CR, et al: Determinants of suicidal ideation in Taiwanese urban adolescents. J Formos Med Assoc 2008;107:156-164.
9. Shan JC, Chen IM, Lin PH, et al: Associations between lifetime mental disorders and suicidal behaviors: findings from the Taiwan psychiatry morbidity survey. Soc Psychiatry Psychiatr Epidemiol 2022;57:1579-1589.
10. Podlogar M C, Rogers ML, Chiurliza B, et al: Who are we missing? nondisclosure in online suicide risk screening questionnaires. Psychol Assess 2016;28:963-974.
11. Berman AL: Risk factors proximate to suicide and suicide risk assessment in the context of denied suicide ideation. Suicide Life-Threat Behav 2018;48(3):340-352.
12. Galynker I: The Suicidal Crisis: Clinical Guide to the Assessment of Imminent Suicide Risk. 1st edition. Oxford: Oxford University Press, 2017.
13. Galynker I, Yaseen ZS, Cohen A, et al: Prediction of suicidal behavior in high risk psychiatric patients using an assessment of acute suicidal state: the suicide crisis inventory. Depression Anxiety 2017;34(2):147-158.
14. Barzilay S, Assounga K, Veras J, et al: Assessment of near-term risk for suicide attempts using the Suicide Crisis Inventory. J Affect Disord 2020;276:183-190.
15. Rogers M., Bafna A & Galynker I: Comparative clinical utility of screening for Suicide Crisis Syndrome versus suicidal ideation in the prediction of suicidal ideation and attempts at one-month follow-up. Suicide Life-Threat Behav 2022;52(5).
16. Yaseen ZS, Hawes M, Barzilay S, et al: Predictive validity of proposed diagnostic criteria for the Suicide Crisis Syndrome: an acute presuicidal state. Suicide Life-Threat Behav 2019;49:1124-1135.
17. Barzilaya S, Assoungab K, Verasb J, et al: Assessment of near-term risk for suicide attempts using the suicide crisis inventory. J Affect Disord 2020;276:183-190.
18. Rogers ML, Galynker I, Yaseen Z, et al: An overview and comparison of two proposed suicide-specific diagnoses: Acute Suicidal Affective Disturbance (ASAD) and Suicide Crisis Syndrome (SCS). Psychiatr Ann 2017;47:416-420.
19. Schuck A, Calat R, Barzilay S, et al: Suicide Crisis Syndrome: a review of supporting evidence for

a new suicide-specific diagnosis. Behav Sci Law 2019;37(3):223-239.
20. Wu CY, Lee MB, Rogers ML, et al: A validation study of the Taiwanese Suicide Crisis Inventory Version 2 to detect suicidality in an online population survey. J Suicidology 2022;17(2):124-133.
21. Bloch-Elkouby S, Barzilay S, Gorman B, et al: The revised suicide crisis inventory (SCI-2): validation and assessment of prospective suicidal outcomes at one month follow-up. J Affect Disord 2021;295:1280-1291.
22. Cohen LJ, Gorman B, Briggs J, et al: The suicidal narrative and its relationship to the suicide crisis syndrome and recent suicidal behavior. Suicide Life-Threat Behav 2018;49(2):413-422.
23. Chang SY, Lee MB, Wu CY, et al.: Associations between suicide narrative, psychopathology, and suicidality: an online population survey in Taiwan. J Suicidology 2022;17(3):224-232.
24. Lee MB, Liao SC, Lee YJ, et al: Development and verification of validity and reliability of a short screening instrument to identify psychiatric morbidity. J Formos Med Assoc 2003;102:687-694.
25. Chen HC, Wu CH, Lee YJ, et al: Validity of the five-item brief symptom rating scale among subjects admitted for general health screening. J Formos Med Assoc 2005;104:824-829.
26. Lung FW, Lee MB: The five-item Brief-Symptom Rating Scale as a suicide ideation screening instrument for psychiatric inpatients and community residents. BMC Psychiatry 2008;8:53-60.
27. Pan CH, Lee MB, Wu CY, et al: Suicidal ideation, psychopathology, and help-seeking in 15 to 19-year-old adolescents in Taiwan: a population-based study 2015-2019. J Affect Disord 2021;282:846-851.
28. Cohen LJ, Gorman B, Briggs J, et al: The suicidal narrative and its relationship to the suicide crisis syndrome and recent suicidal behavior. Suicide Life Threat Behav 2019;49:413-422.
29. Cohen LJ, Mokhtar R, Richards J, et al: The Narrative-Crisis Model of suicide and its prediction of near-term suicide risk. Suicide Life Threat Behav 2022;52:231-243.
30. Kaiser HF, Rice J: Little jiffy, mark IV. Educ Psychol Measurement 1974;34:111-117.
31. Bartlett MS: The effect of standardization on a Chi-square approximation in factor analysis. Biometrika 1951;38:337-344
32. Hu L, Bentler PM: Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct Equ Modeling 1999;6:1-55.
33. Menon V, Bafna AR, Rogers ML, et al: Factor structure and validity of the Revised Suicide Crisis Inventory (SCI-2) among Indian adults. Asian J Psychiatry 2022;12;73:103119.
34. Bloch-Elkouby S, Gorman B, Schuck A, et al: The suicide crisis syndrome: a network analysis. J Counsel Psychol 2020;67(5):595-607.
35. Shneidman ES: Definition of Suicide. New York, John Wiley & Sons, 1985.
36. Klonsky ED, May AM: The three-step theory (3ST): A new theory of suicide rooted in the "Ideation-to-Action" framework. Internat J Cognit Therapy 2015;8(2):114-29.
37. Lee JI, Lee MB, Liao SC, et al: Prevalence of suicidal ideation and associated risk factors in the general population. J Formos Med Assoc 2010;109(2):138-147.

Appendix 1. Five-item Suicide Crisis Scale (SCS-5)

Over the last several days when you were feeling your worst:

1.Did you feel powerless to stop thoughts that were upsetting you? [Loss of cognitive control]
0=Not at all 1=A little 2=Somewhat 3=Quite a bit 4= Extremely

2.Did you feel that your emotional pain was unbearable? [Affective disturbance]
0=Not at all 1=A little 2=Somewhat 3=Quite a bit 4= Extremely

3.Did you feel there is no escape? [Entrapment]
0=Not at all 1=A little 2=Somewhat 3=Quite a bit 4= Extremely

4.Did you feel a lot of emotional turmoil in your gut? [Hyperarousal]
0=Not at all 1=A little 2=Somewhat 3=Quite a bit 4= Extremely

5.Did you feel isolated from others? [Social Withdrawal]
0=Not at all 1=A little 2=Somewhat 3=Quite a bit 4= Extremely

Appendix 2. 自殺危機量表 (Taiwanese Version of SCS-5)

在過去的幾天內，在您感覺最糟糕的時候，您是否有下列感受？
請針對下列每題的嚴重度，勾選最能代表您感覺的答案 :

1. 感到無法停止困擾的想法？
☐ 0 完全沒有、☐ 1 輕微、☐ 2 普通、☐ 3 嚴重、☐ 4 非常嚴重

2. 感到自己的情緒 (心情) 痛苦已經無法承擔？
☐ 0 完全沒有、☐ 1 輕微、☐ 2 普通、☐ 3 嚴重、☐ 4 非常嚴重

3. 感到無法逃離困境 (走投無路) ？
☐ 0 完全沒有、☐ 1 輕微、☐ 2 普通、☐ 3 嚴重、☐ 4 非常嚴重

4. 感到自己情緒 (心情) 很煩亂？
☐ 0 完全沒有、☐ 1 輕微、☐ 2 普通、☐ 3 嚴重、☐ 4 非常嚴重

5. 感到與他人脫離孤立？
☐ 0 完全沒有、☐ 1 輕微、☐ 2 普通、☐ 3 嚴重、☐ 4 非常嚴重

Original Articles

Prevalence of Suicidal Ideation and Thought of Hurting-Others and Associated Psychopathology Among University Students

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Abstract: ***Purpose:*** Suicide is the second leading cause of death among adolescents in many countries including Taiwan. Youth mental health issue including suicide and homicide has become a focus of attention worldwide. The present study investigated the prevalence of suicidal ideation (SI) and thoughts of hurting others (THO) and their associations with the psychopathology among University students.***Method:*** The cross-sectional survey was conducted on the first-year students of a National university in northern Taiwan. The questionnaire comprised basic information on gender, the 5-item Brief Symptom Rating Scale (BSRS-5), and questions about the personal experience of SI and THO over the previous week. All 4066 students (female : male = 2314:1752) finishing the registration for administration were invited to participate in the survey. In total, 3961 students (56.5% males) completed the questionnaire. The ROC curve analysis was used to determine the validity of the BSRS-5 to identify the recent one-week SI and THO. Moreover, regression analysis was performed to examine the associations between BSRS-5 subscales and one-week SI and THO, respectively. Moreover, the path analysis with the structural equation model was conducted to examine the associations of the psychological distress and with one-week SI and THO.***Results:*** The results indicated that SI and THO were significantly inter-correlated (r=0.574) and the prevalence of SI, THO and psychiatric morbidity was 5.9%, 5.8% and 19.8%, respectively. and Logistic regression revealed the significant predictors for SI and THO included psychiatric morbidity (OR=22.7, 11.8), hostility (OR=21.2, 14.5), inferiority (OR=15.0, 8.3), depression (OR=27.8, 11.5), anxiety (OR=23.9, 7.4), and insomnia (OR=11.3, 7.1). The stepwise multiple regression demonstrated 4 items (except for insomnia) of BSRS-5 explained 22.2% and 14.5% of the variances of SI and THO, respectively. Using 4/5 of the BSRS-5 score as a cut-off to predict SI and THO, the rate of accurate classification was 84% and 83%, respectively. ***Conclusion:*** SI and THO were prevalent among the university's incoming students. The BSRS-5 scale is an efficient way to identify SI, THO, and psychological distress and provides timely investigation for the targeted population at risk.

Keywords: suicidal ideation, thought of hurting-others, homicide, 5-item Brief-Symptom-Rating-Scale (BSRS-5), psychopathology, risk factors.

(Journal of Suicidology 2022; 17(4): 352-360. DOI:10.30126/JoS.202212_17(4).0005)

Introduction

Suicide is a crucial issue in mental health and public health across all ages worldwide and has drawn global attention in recent decades [1]. Although a higher prevalence rate of suicide was reported in the elderly than in youth, suicide in youth was the second leading cause of death in many countries, including Taiwan [2, 3], which implies the influential role of suicide in youth death. The previous study has shown complex and subsequent processes of suicide, which involve the initiation of ideation, planning, and attempting behaviors [4]. However, most suicidal death happened at the individual‘s first suicidal attempt and the initiation of ideation accounted for the majority of suicidal behaviors [5-7]. Besides, less than 30% of subjects were willing to seek medical care after suicidal behavior [8]. For the purpose of suicidal prevention, it is highly important to early identify risk factors for suicidal ideation (SI) in order to intervene prior to an attempt and death. Suicidal ideation is highly prevalent in the community (10%-14% across lifetime, 2.3%-14.6% within 12 months of the survey) and has a close link to completed suicide [9].

Risk factors of suicidality were heterogeneous and had different impacts on each stage of suicide. For instance, the environmental influences, such as life stress and social-economical status, were more profound in the early stage of the suicidal process (i.e., death ideation), but mental disorders were more influential in the later stage of the suicidal process (i.e., deliberate self-harm) [5]. In all kinds of psychiatric disorders, mood disorder was a persistent risk factor for all stages of suicidal

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Received: 22 November 2022; **Accepted:** 15 December 2022.

behavior in different countries, although variability was found in the prevalence of suicidal behaviors [10]. Furthermore, rather than mood psychiatric disdisorder, psychological distress still played an important role in suicidal ideation, suicidal plan, and suicidal attempt [11]. Considering the significant impact of psychological distress on suicidal behaviors, earlier exploration of psychological distress and suicidal ideations was urgent.

SI and psychological distress were both common in youth and showed a strong inter-correlation in many nations [12]. Therefore, a rating scale for suicide screening to measure the psychopathology associated with psychiatric morbidity or psychological distress is needed [13, 14]. The BSRS-5 has proven to be a satisfactory instrument to screen psychological distress, psychiatric morbidity, and SI in the community, medical settings, or military setting [14-16].

Homicide, on the other hand, is another serious health problem in youths, but it has often been overlooked [17, 18]. Similar to suicidal behaviors, homicidal behaviors consisted of consequent stages from ideation to attempt [19]. Previous studies showed the correlation between suicide and homicide both in the community and clinical setting [20, 21]. Similar to the results of suicidology studies, substance use disorders and some psychiatric disorders were strong risk factors for homicide in structuralized diagnostic interviews, but screening of psychological distress or psychiatric morbidity using the brief screening tool for the general population was less discussed [22]. For better mental health promotion in the general population, exploration of the interactions among suicide, homicide, and psychiatric morbidity in the youth was necessary.

The present study was conducted among university students and aimed to: 1) estimate the prevalence of SI, THO, and psychiatric morbidity and understand their interactions; and 2) test the validity of the BSRS-5 used to detect SI and THO.

Methods

Participants

This cross-sectional questionnaire survey was conducted on the first-year students of a National university in Taiwan. The survey questions comprised basic information on gender and disciplines of schools, BSRS-5, and questions about personal experience with SI and THO over the past week. All 4066 students (female: male= 2314: 1752) who finished the registration for administration were invited to participate in the survey with informed consent and reassurance of confidentiality. In total, 3961 students, 2236 males (56.5%) and 1725 females (43.5%), completing the questionnaire were recruited for the study.

Measure of psychopathology and thoughts of suicide and hurting-others

The psychological distress was measured using the BSRS-5, which is a self-rating scale for the identification of psychiatric morbidity [13]. The full scale contains the following five items of psychopathology: 1) anxiety, 2) depression; 3) hostility; 4) inferiority; and 5) insomnia. Two additional questions about suicidal ideation (SI) and the thought of hurting others (THO) were added to the questionnaire. The subjects were asked to rate the degree of distress item by item for the above seven questions during the past week, including the current day as follows: 0, not at all; 1, a little bit; 2, moderately; 3, quite a bit; 4, extremely; a total score of the BSRS-5 was calculated for each subject. In the study, presence of psychiatric morbidity was defined as BSRS-5 score $\geqq$ 6.

The BSRS-5 has been reported to have satisfactory psychometric properties to identify psychiatric morbidity in both medical settings practice and the community and to predict further suicidal attempts and re-attempt death [9, 13-16]. It has been widely used in various settings in Taiwan as a screening tool (nick-named Mood Thermometer) by gatekeepers participating in Suicide and Depression Prevention Programs for the identification of psychiatric morbidity and SI [23, 24].

Statistical analysis

In addition to descriptive statistics of demographic variables, the following tests were used for data analysis: Chi-square test with the estimation of odds ratios in 95% confidence interval to examine the association of SI or THO with psychiatric morbidity, psychological distress, and demographic characteristics; t-test to compare the means of BSRS-5 related scores in the subjects with or without SI or THO; Cronbach's alpha to estimate the internal consistency of the BSRS-5; Pearson's correlation to test the association between each variable such as SI, THO, demographics, and the individual items of BSRS-5. Furthermore, stepwise multiple regression analysis was performed to examine which of the five symptom domains and demographic variables had discriminative validity for SI or THO. Moreover, the path analysis with the structural equation model (SEM) was performed to examine the predictive validity of the BSRS-5 for one-week SI and THO to test the model's goodness-of-fit. Additionally, the ROC analysis was used to determine the optimal cut-off point of the BSRS-5 to predict SI and THO, respectively. Statistical significance was set at a level of $p < 0.05$. The SAS version 9.4 software package (SPSS, Chicago, IL and IBM SPSS) and Amos 25.0 software (IBM Corp., Armonk, NY) were used for analysis in the study.

Results

Rates of suicidal ideation and thoughts of hurting others in different groups

As shown in Table 1, among the 3961 community participants, the prevalence of SI over the past week was 5.9%; 6.0% for males, and 5.7% for females. In the present study, we selected one-week SI and one-week THO as the dependent variables for the following association analysis of suicide risks.

As shown in Table 1, the prevalence of THO was 5.78%. In these community samples, the gender difference was noted in the prevalence of THO over the past week (OR = 0.462), where the prevalence of THO was 7.5% in the male population and 3.6% in the female population.

Psychopathological factors associated with suicide ideation or thought of hurting others

In the present study, the prevalence of psychiatric morbidity defined by the BSRS-5 score in all subjects was 8.8% when choosing 5/6 of the BSRS-5 score as the cutoff point, which was widely adopted in previous studies [13]. As Table 1 shows, the BSRS-5 differentiated cases had a significantly higher rate (24.2%, OR=22.685) of having SI in the last week when compared with those below the cut-off value (1.4%). With regard to the association of SI with psychopathology, the subjects with any positive symptom on the BSRS-5 were significantly more likely to have SI; the odds ratios for each symptom to predict SI within the last week were depression, 27.75; inferiority, 15.04; hostility, 21.191; anxiety, 23.898 and insomnia, 11.28 (Table 1).

On the other side, the total score of BSRS-5 also differentiated the risk of THO under the cut-off value (OR = 11.77), and even the existence of each item in BSRS-5 showed a higher risk to have THO; the odds ratios for each symptom to predict THO in the last week were hostility, 14.489; depression, 11.478; inferiority, 8.301; anxiety, 7.437; insomnia, 7.131 (Table 1).

Inter-item correlations between each psychological psychopathology in BSRS-5

As shown in Table 2, the values of all inter-item correlations in BSRS-5 (Pearson's correlation) showed acceptable ranges from 0.361 to 0.684, which is within the ideal range between 0.30 and 0.75. The top two highest inter-item correlation coefficients were 0.684 for depression and hostility, and 0.648 for depression and anxiety. In particularly, SI and THO had a significantly high inter-correlation (r=.574).

The prevalence of suicide ideation only, thought of hurting others only, and suicide ideation + thought of hurting others by gender

The prevalence rates of SI only, THO only, and SI+THO stratified with sex were listed in Table 3. The group of combined SI+ THO showed a significantly higher proportion in both sexes (male = 4.0%, female = 2.5%) compared to the SI-only group or THO-only group. Regarding the general psychological distress

Table 1. The prevalence of suicide ideation, thought of hurting others, and psychopathology.

Variables	Subject number	Presence of suicidal ideation (n=234; 5.9%)		Presence of thought of hurting others (n=229; 5.78%)	
	n (%)	n (%)	Odds ratios (95% CI)	n (%)	Odds ratios (95% CI)
Gender					
Male	2236 (56.5)	135 (6.0)	1	167 (7.5)	1
Female	1725 (43.5)	99 (5.7)	0.063	62 (3.6)	0.462 (0.34-0.62)**
BSRS-5					
Total score					
＜ 6	3175 (80.2)	44 (1.4)	1	68 (2.1)	1
≧ 6	786 (19.8)	190 (24.2)	22.685 (16.16-31.85)**	161 (20.4)	11.77 (8.75-15.83)**
Anxiety					
No	1716 (43.3)	8 (0.7)	1	23 (1.3)	1
Yes	2245 (56.7)	226 (10.7)	23.898 (11.77-48.51)**	206 (9.2)	7.437 (4.81-11.50)**
Hostility					
No	2081 (52.5)	13 (0.6)	1	18 (0.9)	1
Yes	1880 (47.5)	221 (11.8)	21.191 (12.07-37.21)**	211 (11.2)	14.489 (8.92-23.55)**
Depression					
No	2324 (58.7)	13 (0.6)	1	28 (1.2)	1
Yes	1637 (41.3)	221 (13.5)	27.75 (15.79-48.73)**	201 (12.3)	11.478 (7.69-17.14)**
Inferiority					
No	1907 (48.1)	15 (0.8)	1	25 (1.3)	1
Yes	2054 (51.9)	219 (10.7)	15.054 (8.89-25.50)**	204 (9.9)	8.301 (5.453-12.637)**
Insomnia					
No	2717 (68.6)	43 (1.9)	1	59 (2.2)	1
Yes	1244 (31.4)	191 (15.4)	11.28(8.04-15.82)**	170 (13.7)	7.131 (5.26-9.67)**

Note: ** p<0.01.

(Table 3), the participants with co-existence of SI and THO presented the highest level of psychological distress, followed by the SI group and the only THO group. Besides, the males presented a significantly higher proportion in the THO group or combined THO than the females.

Association between psychological distress, suicide ideation and thought of hurting others

When all the significant predictive variables (in Table 1), including individual items of BSRS-5 and demographic variables, were entered for stepwise multiple regression analysis for SI or THO, the selected items showed high similarity on different outcomes and re-confirmed in the logistic regression model (Table 4 and Table 5). In the stepwise regression analysis for SI, four items of the BSRS-5, depression, insomnia, hostility, and inferiority, were significantly selected to explain 22.2% of the variance of SI. The item of depression explained the highest variance (R2=0.189) of SI, followed by insomnia (Table 4). On the other side, similar to the regression model of SI, all five items of the BSRS-5 were selected to explain 14.5% of the variance of THO (Table 4). Similarly, depression and insomnia were top two variable with high beta coefficients.

In the logistic regression model of SI, every item of BSRS-5 had elevated values of odd ratios (2.98-5.01) for SI (Table 5); depression presented the highest odd ratio for SI (OR = 5.01), followed by insomnia (OR=4.15). In addition, the stepwise logistic regression on THO, four items of BSRS-5 (i.e., hostility, depression, inferiority, and insomnia) had elevated odd ratios for THO. Interestingly, the sex factor was selected in the THO model, and the females had a lower odd ratio (OR = 0.34).

The validity of BSRS-5 for identification of suicide ideation and thought of hurting others

Considering the BSRS-5 as a screening instrument for SI and THO in the University population, the ROC analysis revealed that a score of 4/5 was optimal cut-off point of BSRS-5 to determine SI (accurate classification rate = 84%, sensitivity=0.81, specificity=0.84, negative predictive value =0.99, and positive predictive value =0.24, the area under curve (AUC)= 0.91) (Table 6). Using the same cutoff point (4/5), the rate of accurate classification for THO was 0.83 (with sensitivity=0.70, specificity=0.83, negative predictive value =0.98, positive predictive value =0.21 and AUC= 0.86) (Table 6).

In order to estimate the validation from the above conceptual constructs, path analysis with structural equation model on SI and THO by BSRS-5 items were examined (Figure 1). The model fit statistics presented a satisfactory goodness-of-fit; the detailed indices were shown in figure 1, which implied approximation of the model to the real structure. Respectively, shown in Figure 1, the standardized regression coefficients between psychological distress and dependent variables were displayed. Depression (β = 0.27), insomnia (β = 0.15), hostility (β = 0.10), and inferiority (β = 0.05) were significant predictors of SI. Depression (β = 0.18), insomnia (β = 0.16), hostility (β = 0.14) and inferiority (β = -0.08) were predictive of THO. In addition to the direct correlation, the coefficients between each psychological distress were also listed in Figure 1.were significant predictors of SI. Depression (β = 0.18), insomnia (β = 0.16), hostility (β = 0.14) and inferiority (β = -0.08) were predictive of THO. In addition to the direct correlation, the coefficients between each psychological distress were also listed in Figure 1.

Table 2. Inter-item correlations among individual items of BSRS-5, suicidal ideation (SI) and thought of hurting others (THO).

	Anxiety	Hostility	Depression	Inferiority	Insomnia	SI	hurting	sex	BSRS-5
Anxiety	1	.637**	.648**	.583**	.426**	.336**	.233**	.072**	.834**
Hostility	.637**	1	.684**	.530**	.433**	.378**	.313**	.053**	.826**
Depression	.648**	.684**	1	.583**	.437**	.435**	.329**	0.028	.843**
Inferiority	.583**	.530**	.583**	1	.361**	.317**	.254**	.056**	.786**
Insomnia	.426**	.433**	.437**	.361**	1	.334**	.287**	-0.027	.666**
SI	.336**	.378**	.435**	.317**	.334**	1	.574**	0.001	.453**
THO	.233**	.313**	.329**	.254**	.287**	.574**	1	-.070**	.356**
Sex	.072**	.053**	0.028	.056**	-0.027	0.001	-.070**	1	.047**
BSRS-50	.834**	.826**	.843**	.786**	.666**	.453**	.356**	.047**	1

Note: *p<.05, ** p<.01.

Table 3. Gender and severity of psychological distress by suicidal ideation (SI) and thought of hurting others (THO).

	Male	Female	Total	Mean± SD
	n (%)	n (%)	n (%)	
SI (n=103)	47 (2.1)	56 (3.2)	103 (2.6)	8.68±3.56
THO (n=98)	79 (3.5)	19 (1.1)	98 (2.5)	5.97±3.14
SI + THO (n=131)	88 (4.0)	43 (2.5)	131 (3.3)	9.15±3.14
None (n=3629)	2022 (90.4)	1607 (93.2)	3629 (91.6)	2.77±2.84
Total (n=3961)	2236 (100)	1725 (100)	3961 (100)	3.21±3.25

Note: By one-way ANOVA, F=367.980, p<0.0001; Intergroup comparison by Bonferroni test.

Table 4. Stepwise multiple regression in predicting suicidal ideation (SI) and thought of hurting others (THO).

Dependent variable	Variable	B	sig.	R^2
SI				
	1. Depression	0.126	.000	0.189
	2. Insomnia	0.071	.000	0.215
	3. Hostility	0.045	.000	0.221
	4. Inferiority	0.021	.004	0.222
THO				
	1. Depression	0.076	.000	0.108
	2. Insomnia	0.067	.000	0.133
	3. Hostility	0.058	.000	0.142
	4. Anxiety	-0.03	.001	0.143
	5. Inferiority	0.024	.001	0.145

Note: 1. Dependent variable: suicide ideation or thought of hurting others by severity for distress (0 to 4).
2. Independent variables: 5 items of BSRS-5.

Table 5. Stepwise logistic regression on psychological distress by suicidal ideation (SI) and thoughts of hurting others (THO).

Covariates	B	Sig	Exp (B)	95% C.I.	χ^2 (wald)
SI					
1.Anxiety	1.09	0.004	2.98	1.40-6.31	8.096
2.Hostility	1.12	0.001	3.07	1.67-5.65	12.919
3.Depression	1.61	0.001	5.01	2.72-9.23	26.801
4.Inferiority	1.18	0.001	3.25	1.86-5.66	17.305
5.Insomnia	1.42	0.001	4.15	2.92-5.91	62.504
THO					
1.Hostility	1.42	0.001	4.14	2.40-7.14	25.98894
2.Depression	1.03	0.001	2.81	1.77-4.46	19.03366
3.Inferiority	0.97	0.001	2.64	1.67-4.17	17.32037
4.Insomnia	1.06	0.001	2.88	2.08-3.98	40.67002
5.sex	-0.93	0.001	0.34	0.29-0.54	33.73998

Table 6. Parameter summary via ROC curve analysis using optimal cutoff points in the validation of BSRS-5 to predict suicidal ideation and thought of hurting others.

Statistical measures	Suicidal ideation	Hurting others
Optimal cut-off	4/5	4/5
Sensitivity	0.81	0.7
Specificity	0.84	0.83
Accurate classification	0.84	0.83
False positive	0.16	0.17
False negative	0.19	0.30
Negative predictive value	0.99	0.98
Positive predictive value	0.24	0.21
Area under curve	0.91	0.86

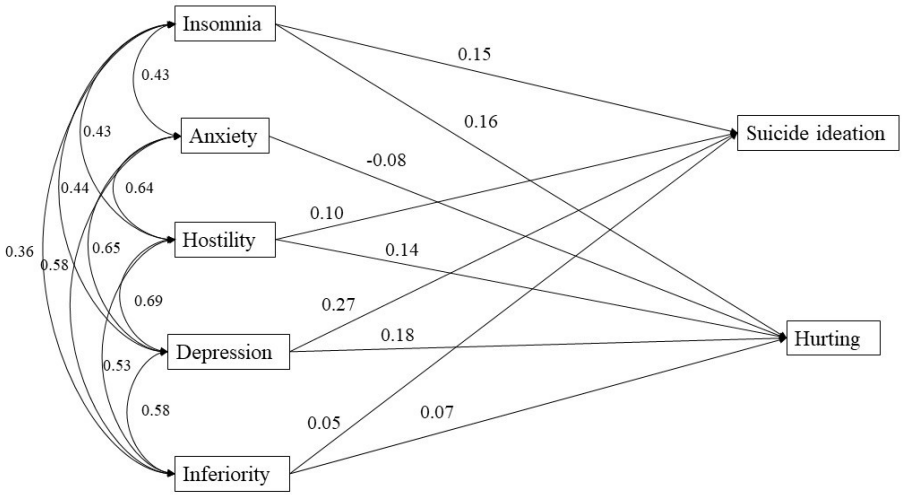

Figure 1. Path analysis with structural equation model on suicidal ideation and thought of hurting others by BSRS-5 items (the values on the lines represent standardized regression coefficients). The model fit statistics were as follows: Cmin/ Df = .044<5, p=0.835, AGFI=1.000>0.9; GFI=1.00>0.9; CFI=1.00>0.9, RMSEA=0.000<0.05.

Discussion

Prevalence of suicide ideation and thought of hurting others

The present study provided the prevalence rate of psychological distress, SI, and THO in University freshmen. Further analysis showed that psychological distress was associated with SI and THO, and respective items of psychological distress were revealed. The screening role of BSRS-5 in freshmen of the University to SI and THO was shown, and ROC analysis told the suitable cutoff value to predict SI and THO.

The prevalence of SI in the recent 1 week in the current study was around 5.9 % in both sexes, which was different from the previous statistics [9, 17]. These differences may be related to the follow-up duration, screening tools, and characteristics of each population. For instance, previous community research on late adolescence had lower suicidal ideation (2.9 %) than the current study [16]. This trend was compatible with the rising trend of suicidal risk from late adolescence and young adulthood (18-24) [25].

On the other side, the prevalence rate of THO in the recent 1 week was 5.78%, and sex differences existed with the higher rate in males (7.5% in males and 3.6% in females). The prevalence rate of THO was comparable with the rate of SI in the same population. Because THO was the initial precursor of physical aggression or homicide, its prevalence rate may show the urgency for the necessity of homicidal prevention just as suicidology in Taiwan. The data on THO prevalence rate was scarce and most studies were specific to psychiatric patients or juvenile patients [26, 27]. The previous study showed that aggression ideation in acute psychiatric setting were 19.8%, and the current prevalence of THO in the community was lower than in the psychiatric patients but were still substantial [26].

Psychopathology, suicidal ideation, and thought of hurting others

As expected, the total scores of BSRS-5 and all psychopathology in BSRS-5 had related to both suicidal ideation and hurting ideation (Table 1.). High scores of BSRS-5 (scores 6) showed a higher risk for the presence of SI (Odds Ratios = 22.69) and THO (Odd Ratios = 11.77). In the following exploration, selected predictive variables for SI were depression, anxiety, hostility, and inferiority. Not surprisingly, depression played the predominant variable for suicidal ideation. This is consistent with previous research in which depression was a central factor for suicidal behavior in different populations [14, 28]. The predictive roles of anxiety, hostility, and inferiority on suicide were also consistent with previous studies [29]. Despite the long-lasting evidence of BSRS-5 in suicidology, there were some differences in different populations [14, 15]. In the previous study, community samples showed depression, inferiority, and hostility as predictive factors in the analysis without insomnia [14]. This difference may relate to the age range difference. Our sample focused on freshmen at the university, and sleep difficulties at this age have been shown as a risk factor for suicidality [30].

Although youth violence or homicide was also a severe health problem, the study of psychological risk factors in adolescent violence was limited, especially in community settings [31]. Most studies focused on the at-risk population which wasn't suitable for policy-making on the general population [26, 27]. For this paucity, current analysis filled this gap. In the stepwise regression, depression, insomnia, hostility, anxiety, and inferiority were shown associated with THO. Interestingly, depression also played as the first predictive factor for THO in stepwise regression, just like suicidal ideation. Previous studies indicated that suicidal ideation and violent ideation had a high correlation but showed differential characteristics, and routine assessment of both violent ideation and suicidal ideation was highly suggested [17, 26]. Hostility and physical aggression were related to adolescent suicidal behavior in community settings [32]. Following prior study, during validation of the proposed model, the path analysis including two dependent variables, SI and THO, showed good model fitting. In both SI and THO groups, depression played a major predictive role in the outcome (standardized coefficients: 0.27 for SI, and 0.18 for THO).

In the current study, multiple psychological variables in BSRS-5 showed significant associations with SI and THO, and shared a similar pattern of such associations. However, the different psychopathology played different weights to develop SI or THO. For instance, depression and insomnia were more prominent for SI; hostility, insomnia and depression had closer relations with THO. Considering the current limitation of cross-sectional design and single site, multi-site sampling, and longitudinal design are needed for studying the mechanism of SI and THO in furture research.

BSRS-5 as a screening measure for thoughts of suicide and homicide

The ROC analysis for the BSRS-5 result in this college group suggested a cut-off score (score 5). Previous data showed the cut-off value varied across the target population, which implies the different weight of each psychological value on SI [33]. In SI and THO screening, the cut-off point was 4/5 and yielded good NPV values (NPV of SI = 0.99 and NPV of THO = 0.98). Considering the long-lasting existence of stigmatization of suicidal ideation, the issue of social desirability may lessen the response rate of suicidal ideation [34]. That is, BSRS-5 provides the alternative choice to detect violence/homicide risk, as well as suicide.

Counseling centers were well-established on university campuses. Brief but applicable screening tool as BSRS-5 were ideal assessments for severe mental health issues, SI and THO.

Strength, Limitation, and Conclusion

The present research connected SI, THO and psychological distress in university incoming students screening, which were scarcely discussed in previous literature. The study found that SI and THO were highly

inter-correlated. The psychological distress by BSRS-5 was both significantly correlated with THO and SI in a similar pattern. Moreover, psychological distress was predictive for SI and THO simultaneously. The proposed model of screening was tested with good model fitness.

Limited to the current cross-sectional design, the true causal inference may need further experimental designs to validate (e.g., such as longitudinal research). That is, the deduction of generalization needs to be careful. However, this study validated BSRS-5 as a useful tool to detect SI and THO in the population of college years. Usage of BSRS-5 to earlier identify the students with SI and THO may be promising in the future research of preventive medicine and the public health.

Conflicts of Interest

The authors report no relevant disclosures.

References

1. Naghavi M: Global, regional, and national burden of suicide mortality 1990 to 2016: systematic analysis for the Global Burden of Disease Study 2016; BMJ 2019; 364:l94.
2. Bilsen J: Suicide and youth: risk factors. Front Psychiatry 2018; 9:540.
3. Department of Health Executive Yuan T: Profile of the Taiwan region: 10 leading causes of death structured by age, in death statistics results summary. 2008 https://www.mohw.gov.tw/np-128-2.html
4. Mann JJ, Apter A, Bertolote J, et al: Suicide prevention strategies: a systematic review. JAMA 2005; 294(16):2064-2074.
5. Neeleman J, de Graaf R, Vollebergh W: The suicidal process: prospective comparison between early and later stages. J Affect Disord 2004; 82(1):43-52.
6. Cavanagh JT, Carson AJ, Sharpe M, et al: Psychological autopsy studies of suicide: a systematic review. Psychol Med 2003; 33(3):395-405.
7. Jordan JT, McNiel DE: Characteristics of persons who die on their first suicide attempt: results from the National Violent Death Reporting System. Psychol Med 2020; 50(8):1390-1397.
8. De Leo D, Cerin E, Spathonis K, et al: Lifetime risk of suicide ideation and attempts in an Australian community: prevalence, suicidal process, and help-seeking behaviour. J Affect Disord 2005; 86(2-3):215-224.
9. Lee JI, Lee MB, Liao SC, et al: Prevalence of suicidal ideation and associated risk factors in the general population. J Formos Med Assoc 2010; 109(2):138-147.
10. Nock MK, Borges G, Bromet EJ, et al: Cross-national prevalence and risk factors for suicidal ideation, plans and attempts. Br J Psychiatry 2008; 192(2):98-105.
11. Duffy ME, Twenge JM, Joiner TE: Trends in mood and anxiety symptoms and suicide-related outcomes among U.S. Undergraduates, 2007-2018: evidence from two national surveys. J Adolesc Health 2019; 65(5):590-598.
12. Eskin M, Sun JM, Abuidhail J, et al: Suicidal behavior and psychological distress in university students: a 12-nation study. Arch Suicide Res 2016; 20(3):369-388.
13. Chen HC, Wu CH, Lee YJ, et al: Validity of the five-item Brief Symptom Rating Scale among subjects admitted for general health screening. J Formos Med Assoc 2005; 104(11): 824-829.
14. Lung FW, Lee MB: The five-item Brief-Symptom Rating Scale as a suicide ideation screening instrument for psychiatric inpatients and community residents. BMC Psychiatry 2008; 8:1-8.
15. Ma CC, Tai YM: Cut-off values of Five-item Brief Symptom Rating Scale in evaluating suicidality among military recruits. Taiwan J Psychiatry 2014; 28:109-129.
16. Pan CH, Lee MB, Wu CY, et al: Suicidal ideation, psychopathology, and help-seeking in 15 to 19-year-old adolescents in Taiwan: a population-based study 2015-2019. J. Affect. Disord 2021; 282: 846-851.
17. Harter S, Low SM, Whitesell NR: What have we learned from columbine: the impact of the self-system on suicidal and violent ideation among adolescents. J. Sch. Violence 2003; 2:1015-1017.
18. Vaughn MG, Carbone J, DeLisi M, et al: Homicidal ideation among children and adolescents: evidence from the 2012-2016 nationwide emergency department sample. J. Pediatr 2020; 219: 216-222.
19. Gregory M. Asnis, Margaret L. Kaplan, Herman M. van Praag, et al: Homicidal behaviors among psychiatric outpatients. Psychiatr. Serv 1994;45(2): 127-132.
20. Apter A, Gothelf D, Orbach I, et al: Correlation of suicidal and violent behavior in different diagnostic categories in hospitalized adolescent patients. JAACAP 1995; 34: 912-918.
21. Mathews S, Abrahams N, Martin LJ, et al: Homicide pattern among adolescents: a national epidemiological study of child homicide in South Africa. PLoS ONE 2019; 14: 1-10.
22. Asnis GM, Kaplan ML, Hundorfean G, et al: Violence and homicidal behaviors in psychiatric disorders. Psychiatr Clin North Am 1997; 20(2): 405-425.
23. Liao S, Lee M, Cheng W: Prevalence and correlates of suicide ideation, plans, and attempts in Taiwan communities: results from the national mental health census. In Proceedings of the 12th Pacific Rim College of Psychiatrist Scientific Meeting, October 2006, Taipei, Taiwan.
24. Lee MB, Tai CW, Liao SC, et al: The strategy and prospects of suicide prevention in Taiwan. J. Nurs 2006; 53(6): 5-13.
25. Hooven C, Snedker KA, Thompson EA: Suicide risk at young adulthood: continuities and discontinuities from adolescence. Youth Soc 2012: 44(4): 524-547.
26. Furnes D, Gjestad R, Rypdal K, et al: Suicidal and violent ideation in acute psychiatric inpatients: prevalence, co-occurrence, and associated characteristics. Suicide Life-Threat. Behav 2021; 51(3): 528-539.
27. Grisso T, Davis J, Vesselinov R, et al: Violent thoughts and violent behavior following hospitalization for mental disorder. J Consult Clin Psychol 2000; 68(3): 388-398.
28. Cash SJ, Bridge JA: Epidemiology of youth suicide and suicidal behavior. Curr Opin Pediatr 2009;

21(5): 613-619.
29. Goodwin RD, Marusic A: Feelings of inferiority and suicide ideation and suicide attempt among youth. Croat Med J 2003; 44(5): 553-557.
30. Goldstein TR, Franzen PL: Sleep difficulties and suicidality in youth: current research and future directions. Curr Opin Psychol 2020; 34: 27-31.
31. Copelan RI, Messer MA, Ashley DJ: Adolescent violence screening in the ED. Am J Emerg Med 2006; 24(5): 582-594.
32. Zhang P, Roberts RE, Liu Z, et al: Hostility, physical aggression and trait anger as predictors for suicidal behavior in Chinese adolescents: a school-based study. PLoS One 2012; 7(2): e31044.
33. Wu CY, Lee JI, Lee MB, et al: Predictive validity of a five-item symptom checklist to screen psychiatric morbidity and suicide ideation in general population and psychiatric settings. J Formos Med Assoc 2016; 115(6): 395-403.
34. Miotto P, Preti A: Suicide ideation and social desirability among school-aged young people. J Adolesc 2008; 31(4): 519-533.

Original Articles

Suicidality, Psychopathology, Resilience, and Psychosocial Correlates of Internet Addictive Disorder Among the Internet Users: An Online Questionnaire Survey

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Abstract: ***Background:*** Internet addiction (IA) has become a major public health issue worldwide and is closely linked to psychiatric disorders and suicide. The American Psychiatric Association has published the diagnostic criteria for Internet Gaming Disorder (IGD) in the 5th Diagnostic and Statistical Manual of Mental Disorders (DSM-5). The present study aimed to investigate the associated psychosocial and psychopathological determinants, insight and seeking behavior of Internet Addictive Disorder (IAD) among internet users of different age groups.***Methods:*** The study was a cross-sectional online survey. The participants were recruited from the general public who completed a series of self-reported measures, including 9-item Internet Addictive Disorder Questionnaire (IAD-9), Five-item Brief Symptom Rating Scale (BSRS-5), Neuroticism Scale (NS), Brief Resilience Coping Scale (BRCS), suicide assessment and internet use habits.***Results:***We enrolled 1012 respondents (52.2% of females; 76.1% aged 15-24). Based on the cutoff for IAD-9, the prevalence rate of IAD among internet users was 23.7%. Participants with higher scores of IAD-9 were characterized as female, unemployed, with higher neuroticism, lower resilience, life impairment due to internet use, more time for internet use, online gaming, high BSRS-5 score, recent suicidal ideation, and past suicide attempts. Stepwise multiple regression on the IAD-9 score revealed that neuroticism, BSRS-5 score, and resilience accounted for 36.2% of the variance for IAD-9 score. Further, logistic regression indicated that neuroticism, life impairment, psychiatric morbidity, and resilience were the four main predictors for IAD. Compared to those without IAD, the IAD individuals presented higher rates of psychiatric morbidity (74.6%), recent suicidal ideation (64.2%), lifetime suicide attempts (27.1%), and suicide attempts in a year (32.5%). Although the majority (77.1%) of IAD individuals had a positive insight toward IAD, only 16.3% of them sought help from mental health services. ***Conclusions:*** Neurotic personality traits, psychopathology, low resilience, and life impairment were significant predictors of IAD. The IAD individuals had a high prevalence of psychiatric morbidity and suicide risks. The findings provide important information for further investigation and prevention of IAD and its mental health co-morbidity.

Keywords: suicide, internet addiction, 5-item Brief Rating Scale (BSRS-5), resilience, neuroticism, psychopathology.

(Journal of Suicidology 2022; 17(4): 361-375. DOI:10.30126/JoS.202212_17(4).0008)

Introduction

Rapidly increasing internet use worldwide has become inevitable in current modern society. Excessive or maladaptive internet use tends to negatively impact life functions and lead to internet addiction (IA) resulting in severe psychosocial distress and impairment in health or interpersonal relationships [1, 2]. The common types of IA-associated activity include online gaming, gambling, shopping, social networking, virtual sex, and information overload. Internet users with IA may initially use it as a way to escape reality and later feel "trapped" by the Internet.

Previous epidemiological studies revealed a wide range of prevalence rates of IA in adolescents ranging from 4.5% to 90% [3-8]. Although most of the past IA studies were centered on young people, IA could occur across different ages. In particular, IA was highly co-existent with various mental problems [9, 10], such as attention-deficit hyperactivity disorder (ADHD), depression, anxiety disorders, low self-esteem, impulsivity, social anxiety, neuroticism, and suicide [11-18]. In addition to risk factors, resilience was considered a significant protective factor of IA [19].

There was no consensus on the diagnostic criteria of IA until the internet gaming order (IGD) was proposed in DSM-5 in 2013 [20] and gaming disorder (GD) in ICD-11 in 2018 [21]. The IGD or GD as defined by the APA or WHO may help unify the different approaches; however, there has been criticism that subtypes of IA were not only related to gaming; for instance, engagement in social networking sites (SNS) or other online activity such as shopping was also reported to have the potential for addiction [22-24]. Given that IGD is one type of internet addictive disorder, neglecting other types of

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Received: 1 December 2022; **Accepted:** 19 December 2022.

internet addiction might underestimate the negative consequences of various addictive online behaviors. Wu CY et al (2019) extended the concept of IGD and conducted a nationwide survey using the DSM-5 criteria framework to estimate the prevalence and associated sociodemographic and psychopathological determinants of IGD and non-gaming IAD in the general population [25]. The study indicated that the one-year prevalence of IAD was 1.9% (1.2% for IGD and 0.7% for non-gaming IAD). A wide range of associated risks of IAD individuals was revealed: being young , unemployment or students, recent psychological distress, recent and lifetime suicidal ideation, and engaging in persistent multiple online activities. Age and psychopathology (i.e., insomnia, depression, and inferiority) were significant predictors of IAD by regression analysis [25].

The present study further investigated: 1) the associated risk and protective factors of IAD; 2) insight and mental health help-seeking among IAD individuals.

Methods

Participants

The present study was a cross-sectional online questionnaire survey using a convenient sampling method and ethically approved by the Institutional Review Board of the corresponding author's affiliated hospital (201204034RIC). The participants were recruited from the general public through e-mails and announcements on popular websites during 2018-2019. They were invited to fill out anonymously a series of structured questions, which consisted of the IAD-9, Five-item Brief Symptom Rating Scale (BSRS-5), MPI-Neuroticism Scale, Brief Resilience Coping Scale (BRCS), a suicide assessment, and internet usage habits. A total of 1012 respondents who completed the whole survey questions were enrolled for analysis.

Demographic data and questions about internet use

Other than demographic items (i.e., gender, age, education, marital status, and occupation), the participants were asked to fill out the information related to internet use habits including types of online activities (i.e., gaming, social networking, or working), time spent on internet (hours per week) except for school work or job required, levels of negative impacts of internet use on life function (1: none; 2: mild; 3: moderate; and 4: severe).

Measures

Scale for Internet Addictive Disorder (IAD-9)

The IAD-9 scale was developed based on the concept and framework of the 9-item DSM-5 criteria for IGD to assess IAD in general [25]. Responses of yes (score 1) or no (score 0) for the 9-item criteria for IAD were assessed. The cut-off numbers of five or more criteria to diagnose IGD, previously proven as valid for young adults in Taiwan [26], were adopted to diagnose IAD in the study. Participants who gave positive responses to five or more items (scoring 5 or greater) were diagnosed with IAD.

Five-item Brief Symptom Rating Scale (BSRS-5) and suicide assessment

The BSRS-5 is a 5-item Likert scale by self-report for measurement of psychological distress. A higher score indicates poorer mental health [27]. The full scale comprises the following 5 items: 1) having trouble falling asleep (insomnia); 2) feeling tense or keyed up (anxiety); 3) feeling easily annoyed or irritated (hostility); 4) feeling blue (depression); and 5) feeling inferior to others (interpersonal hypersensitivity: inferiority). An additional question, "Do you have any suicide ideation?" was added at end of the scale. All respondents were asked to rate the level of distress for each item during the past week, including the current day on a five-point scale: 0, not at all; 1, a little bit; 2, moderately; 3, quite a bit; 4, extremely. A total score of five items was calculated for each individual. The presence of psychiatric morbidity was defined as the BSRS-5 score $\geqq$ 6. The BSRS-5 has been reported to have satisfactory psychometric properties to identify psychiatric morbidity and suicidal ideation in medical settings or the community [27-29] as well as predict reattempted suicidal death [30]. Additionally, the participants were asked about their personal experience with suicide (i.e., attempt over the past month, past year, or cross lifetime).

MPI-Neuroticism Scale

The Neuroticism Scale consisted of 13 items describing personality traits, selected from the Maudsley Personality Inventory (MPI) [31]. Each item was rated according to personal experience as yes/?/No. A "Yes" response indicates that the individual agrees with the description suitable for him. The " ?" response indicates that the respondents had difficulty making a clear decision. The higher score means higher trends of neuroticism, which was considered to be more prone to poorer mental health. Besides, additional 4 items of social desirability were used as a reference for scoring lies. A complete positive response to all 4 items is suspected to provide data that is highly unreliable and could be excluded from the analysis.

Brief Resilient Coping Scale (BRCS)

The 4-item scale was used to assess personal tendencies to cope with stress adaptively [32]. The four items represent four components of coping strategies, i.e., active coping with loss, positive growth, problem-solving, and self-control. It is rated on a 5-point scale response, ranging from 1=does not describe me at all to 5=describes me very well. Total sum scores range from 4 to 20; scores of 4-13: low; 14-16: medium and 17-20: high resilient coping. The BRCS had satisfactory reliability [33,34] and good criterion validity with well-established measures of well-being, optimism, self-esteem, self-efficacy, and mental health, as suggested in the resilience literature) [35,36].

Statistics analysis

Other than descriptive statistics of demographic and psychosocial variables, the following tests were used for data analysis: Exploratory factor analysis using

principal component analysis with Varimax rotation to test the construct validity of IAD-9; Chi-squared test with an estimation of odds ratios in 95% confidence interval to examine the associations between internet addiction defined by IAD-9, psychological distress, neuroticism, resilience, and other related psychosocial variables; Cronbach's alpha to estimate the internal consistency of IAD-9, BSRS-5, resilience, and Neuroticism Scale; Pearson's correlation to test the correlation between IAD-9, individual item of BSRS-5, suicidal ideation, neuroticism, resilience, and other demographic information. Furthermore, stepwise multiple regression and logistic analysis were performed to examine which of the psychosocial factors, personality, resilience, psychopathology and internet use related variables had discriminative validity for IAD scores or the presence of IAD. Moreover, the path analysis with a structural equation model was conducted to examine the predictive validity of the above significant correlates for IAD. Statistical significance was set at a level of $p < .05$. The SPSS 19.0 software package (SPSS, Chicago, IL) was used in this study.

Results

Demographics and personal information

In total, 1012 participants were included for analysis, with 528 females (52.2%). Their personal characteristics are summarized in Table 1. A majority of the participants were single (87.9%), aged below 25 years (76.1%), and students (69.1%). With regard to the forms of regular internet activity, a great majority (n=877, 86.7%) chose multiple activities of which interactive communication (55.8%) and social networking (51.1%) were the most common, followed by online video (48.8%) and online gaming (26.8%). The remaining subjects (n=135, 13.3%) engaged in a single internet activity distributed as online communication (n=50, 5.1%), video watching (n=33, 3.4%), gaming (n=28, 2.9%), social networking (n=14, 1.4%) and online shopping (n=3, 0.3%).

IAD-9 scores and prevalence of IAD by demographics, psycho-social, and psychopathological variables

The mean scores of IAD-9 by demographics and personal characteristics among the participants were displayed in Table 1. A significantly higher score was noted for the individuals with the following characteristics: unemployed, higher neuroticism, lower resilience, psychiatric morbidity, suicidal ideation in the previous week or attempted suicide in the past year or during their lifetime, regularly online gaming, online shopping, or online video-watching.

According to the established criteria (IAD-9 $\geq$ 5), the prevalence of IAD was estimated as 23.7% (240/1012) among the participants. As Table 2 showed, there were some characteristics of individuals presented significantly higher rates of IAD: higher neuroticism (N $\geq$ 16) (OR=8.86), psychiatric morbidity (BSRS-5 $\geq$ 6) (OR=7.31), low resilience (OR=5.97), life impairment (OR=4.04), age (25-44) (OR=3.52), online shopping (OR=1.98) and online gaming (OR=1,91). With regard to psychopathology (Table 2), the IAD individuals who presented a significantly higher rate of psychiatric morbidity (74.6%) with inferiority (87.9%), hostility (87.5%), depression (87.3%), anxiety (85.4%), insomnia (81.7%) and suicidal ideation (64.2%) than the non-IAD. The individuals with psychiatric morbidity, individual symptoms on the BSRS-5, and suicidal ideation had a significantly higher odds ratio of having IAD (Table 2). Moreover, such associations had a significant dose-response relationship (Table 3). When all significant psychosocial and psychopathological correlates of IAD including demographic variables, forms of internet activity, occupation, N-score, BSRS-5 score and resilience score were entered for multivariate logistic regression analysis using the stepwise method, the results indicated that neuroticism (OR=4.08), life impairment (OR=3.03), BSRS-5 (OR=2.20) and resilience (OR=1.72) were significant predictors for IAD (Table 3).

Regarding the association between IAD and psychosocial variables based on the Pearson's correlation (Table 4), most items of psychometric measures had significant but moderate correlations with the IAD-9 score. The neuroticism presented with the highest correlation coefficient ($r=.58$, $p<01$), followed by BSRS-5 scores ($r=.53$, $p<.001$), resilience ($r=-.331$, $p<.01$) and internet activity ($r=.122$, $p<.01$). When all the associated variables with IAD-9 were entered for stepwise multiple regression analysis, the results indicated that neuroticism, life impairment, internet activity, resilience, and BSRS-5 were significantly selected to explain 41.9% of total variance for IAD-9 score (Model 1 in Table 5). Furthermore, seven items of the neuroticism scale accounted for 35.3% of the variance of the IAD-9 score (Model 2 in Table 5; and inferiority and hostility explained 28.4% of the variance of IAD-9 (Model 3 in Table 5). The above-mentioned findings demonstrated that the IAD-9 score was mainly contributed by personality traits (neuroticism), life impairment, internet activity, coping (resilience), and psychopathology (BSRS-5). The path analysis with the structural equation model revealed neuroticism, life impairment, resilience, and psychopathology were significant predictors for IAD-9 with a satisfactory goodness-of-fit value of 1.0 ($p<0.001$), which indicated that the model approximated the real structure (Figure 1).

IAD and Suicidality

With respect to suicidality, the IAD individuals reported having suicidal ideation in the recent week (64.2%), suicide attempts in the past year (12.5%), and suicide attempts in a lifetime (27.1%). Accordingly, as Table 2 showed, the individuals at high suicide risk presented a significantly higher prevalence of IAD than the countered parts. Further, the one-week suicidal ideation (SI) had a significant correlation coefficient with IAD ($r=.440$), general psychological distress (BSRS-5) ($r=.813$), neuroticism ($r=.649$), and resilience ($r=-.501$). In addition, the one-week SI had a significantly large coefficient with individual BSRS-5 symptoms (i.e., depression, $r=.806$; hostility, $r=.760$; inferiority, $r=.735$; anxiety, $r=.734$; insomnia, $r=.628$).

Table 1. IAD-9 scores by demographics and psychosocial variables (N=1012).

Variables	n (%)	Mean ± SD	p-value	Effect size
Gender				
Female	528 (52.2)	2.99 ± 2.44	.271	0.001††
Male	484 (47.8)	2.82 ± 2.65		
Age				
<25	770 (76.1)	2.79 ± 2.50	<.001†	0.016††
25-44	204 (20.2)	3.50 ± 2.64		
≧ 45	38 (3.8)	2.08 ± 2.38		
Marital status				
Single	890 (87.9)	2.95 ± 2.55	.373†	0.002††
Married/cohabited	110 (10.9)	2.59 ± 2.39		
Divorced/separated/widowed	12 (1.2)	2.83 ± 3.01		
Occupation				
Student	699 (69.1)	2.72 ± 2.44	<.001†	0.06††
Employed	253 (25.0)	2.85 ± 2.43		
Housewife/retired/unemployed	60 (5.9)	5.38 ± 2.83		
Online gaming				
Yes	271 (26.8)	3.50 ± 2.62	<.001	0.02
No	741 (73.2)	2.70 ± 2.48		
Internet use time				
< 13 hr(s)	511 (50.5)	2.64 ± 2.57	.001	0.012
≧ 13 hrs	501 (49.5)	3.19 ± 2.48		
Life impairment				
Yes	607 (63.3)	3.50 ± 2.62	<.001	0.08
No	405 (40.0)	2.03 ± 2.14		
N-score of MPI				
< 16	641 (63.3)	1.91 ± 1.89	<.001	0.268
≧ 16	371 (36.7)	4.64 ± 2.60		
BSRS-5 score				
0-5	612 (60.5)	1.96± 1.99	<.001	0.216
6-20	401 (39.5)	4.37 ± 2.60		
Resilience				
0-8	361 (35.7)	3.74 ± 2.94	<.001	0.065
9-12	477 (47.1)	2.58 ± 2.25		
13-16	174 (17.2)	2.07 ± 1.83		
Suicidal thoughts in a week				
Yes	334 (33.0)	4.44 ± 2.74	<.001	0.18
No	678 (67.0)	2.15 ± 2.05		
Attempted suicide in lifetime				
Yes	154 (15.2)	4.22 ± 2.82	<.001	0.048
No	858 (84.8)	2.67 ± 2.41		
Attempted suicide in past year				
Yes	63 (6.2)	4.75 ± 2.93	<.001	0.035
No	949 (93.8)	2.79 ± 2.47		
Internet activity				
0-10	368 (36.4)	2.64 ± 2.57	<.001	0.018
11~13	335 (33.1)	2.73 ± 2.40		
14~21	309 (30.5)	3.42 ± 2.59		

Note: †The analysis was performed with ANOVA; the rest was performed with t-test.
††The effect size value was eta square; the rest was Cohen's d.

Table 2. Univariate logistic regression analysis on IAD by demographics, internet use habits, neuroticism, resilience, and psychopathology.

Covariates	IAD		β	p	OR	95% CI of OR	
	Presence (n=240) N (%)	Absence (n=772) N (%)				Lower	Upper
Gender							
Female	124 (51.7)	404 (52.3)					
Male	116 (48.3)	368 (47.7)	0.03	0.86	1.03	0.77	1.37
Age							
<25	164 (68.3)	606 (78.5)	0.58	0.23	1.79	0.69	4.65
25-44	71 (29.6)	133 (17.2)	1.26	0.01	3.52	1.32	9.42
≧ 45	5 (2.1)	33 (4.3)					
Marital status							
Single	213 (88.8)	677 (87.7)	0.23	0.36	1.26	0.77	2.06
Married/cohabited	22 (9.2)	88 (11.4)					
Divorced/separated/widowed	5 (2.1)	7 (0.9)	1.05	0.10	2.86	0.83	9.86
Occupation							
Student	138 (57.5)	561 (72.7)					
Employed	63 (26.3)	190 (24.6)	0.30	0.09	1.35	0.96	1.90
Housewife/retired/unemployed	39 (16.3)	21 (2.7)	2.02	<.0001	7.55	4.30	13.24
Internet use time							
< 13 hr(s)	108 (45)	403 (52.2)					
≧ 13 hrs	132 (55)	369 (47.8)	0.29	0.05	1.34	1.00	1.79
Online gaming							
Yes	89 (37.1)	182 (23.6)	0.65	<.0001	1.91	1.40	2.61
No	151 (62.9)	590 (76.4)					
Social networking							
Yes	132 (55)	385 (49.9)	0.21	0.17	1.23	0.92	1.64
No	108 (45)	387 (50.1)					
Interactive communication							
Yes	128 (53.3)	437 (56.6)					
No	112 (46.7)	335 (43.4)	0.13	0.37	1.14	0.85	1.53
Online video							
Yes	133 (55.4)	361 (46.8)	0.35	0.02	1.42	1.06	1.89
No	107 (44.6)	411 (53.2)					
Online Reading							
Yes	50 (20.8)	101 (13.1)	0.56	0.004	1.75	1.20	2.54
No	190 (79.2)	671 (86.9)					

Table 2 (Cond't). Univariate logistic regression analysis on IAD by demographics, internet use habits, neuroticism, resilience, and psychopathology.

Covariates	IAD		β	p	OR	95% CI of OR	
	Presence (n=240) N (%)	Absence (n=772) N (%)				Lower	Upper
Online shopping							
Yes	40 (16.7)	71 (9.2)	0.68	0.001	1.98	1.30	3.00
No	200 (83.3)	701 (90.8)					
Life impairment							
Yes	197 (82.1)	410 (53.1)	1.40	<.0001	4.04	2.83	5.79
No	43 (17.9)	362 (46.9)					
N-score							
< 16	61 (25.4)	580 (75.1)					
≧ 16	179 (74.6)	192 (24.9)	2.18	<.0001	8.86	6.35	12.37
Mean (SD)	19.4 (6.9)	9.6 (8.0)					
BSRS-5 score							
0-5	61 (25.4)	551 (71.4)					
6-20	179 (74.6)	221 (28.6)	1.99	<.0001	7.31	5.26	10.17
Mean (SD)	10.7 (5.9)	4.5 (5.1)					
Suicidal thoughts							
Yes	154 (64.2)	180 (23.3)	1.77	<.0001	5.89	4.31	8.05
No	86 (35.8)	592 (76.7)					
Suicide attempt in lifetime							
Yes	65 (27.1)	89 (11.5)	1.05	<.0001	2.85	1.99	4.09
No	175 (72.9)	683 (88.5)					
Suicide attempt in past year							
Yes	30 (12.5)	33 (4.3)	1.16	<.0001	3.20	1.91	5.37
No	210 (87.5)	739 (95.7)					
Seeking psychiatric help							
Yes	69 (28.8)	71 (9.2)	1.38	<.0001	3.98	2.75	5.77
No	171 (71.3)	701 (90.8)					
Resilience							
0-8	136 (56.7)	225 (29.1)	1.79	<.0001	5.97	3.42	10.41
9-12	88 (36.7)	389 (50.4)	0.80	0.01	2.23	1.27	3.92
13-16	16 (6.7)	158 (20.5)					

Table 2.(continued).

Covariates	IAD			β	p	OR	95% CI of OR		CHISQ p-value
	Presence (n=240) n (%)	Absence (n=772) n (%)	Total (n=1012) N				Lower	Upper	
Insomnia									<.0001
0	44 (11.3)	347 (88.7)	391						
1	75 (23.2)	248 (76.8)	323	0.87	<.0001	2.39	1.59	3.58	
2	46 (29.1)	112 (70.9)	158	1.18	<.0001	3.24	2.03	5.16	
3	33 (45.8)	39 (54.2)	72	1.90	<.0001	6.67	3.81	11.68	
4	42 (61.8)	26 (38.2)	68	2.54	<.0001	12.74	7.12	22.77	
Anxiety									<.0001
0	35 (8)	401 (92)	436						
1	67 (24.2)	210 (75.8)	277	1.30	<.0001	3.66	2.35	5.69	
2	47 (35.6)	85 (64.4)	132	1.85	<.0001	6.34	3.86	10.41	
3	45 (51.1)	43 (48.9)	88	2.48	<.0001	11.99	6.97	20.62	
4	46 (58.2)	33 (41.8)	79	2.77	<.0001	15.97	9.08	28.10	
Hostility									<.0001
0	30 (7.1)	392 (92.9)	422						
1	56 (20.1)	223 (79.9)	279	1.19	<.0001	3.28	2.05	5.27	
2	52 (40.9)	75 (59.1)	127	2.20	<.0001	9.06	5.43	15.13	
3	47 (50.5)	46 (49.5)	93	2.59	<.0001	13.35	7.70	23.15	
4	55 (60.4)	36 (39.6)	91	2.99	<.0001	19.96	11.40	34.97	
Depression									<.0001
0	28 (6.9)	376 (93.1)	404						
1	49 (17.9)	224 (82.1)	273	1.08	<.0001	2.94	1.79	4.81	
2	43 (39.1)	67 (60.9)	110	2.15	<.0001	8.62	5.01	14.82	
3	55 (51.9)	51 (48.1)	106	2.67	<.0001	14.48	8.43	24.87	
4	65 (54.6)	54 (45.4)	119	2.78	<.0001	16.16	9.54	27.38	
Inferiority									<.0001
0	29 (6.9)	394 (93.1)	423						
1	45 (18.9)	193 (81.1)	238	1.15	<.0001	3.17	1.93	5.21	
2	44 (35.2)	81 (64.8)	125	2.00	<.0001	7.38	4.36	12.49	
3	41 (48.8)	43 (51.2)	84	2.56	<.0001	12.95	7.32	22.91	
4	81 (57)	61 (43)	142	2.89	<.0001	18.04	10.91	29.82	
Suicidal thoughts									<.0001
0	86 (12.7)	592 (87.3)	678						
1	29 (27.9)	75 (72.1)	104	0.9789	<.0001	2.66	1.64	4.32	
2	39 (45.9)	46 (54.1)	85	1.7641	<.0001	5.84	3.60	9.46	
3	38 (63.3)	22 (36.7)	60	2.4754	<.0001	11.89	6.71	21.05	
4	48 (56.5)	37 (43.5)	85	2.1894	<.0001	8.93	5.50	14.50	

Table 3. Stepwise logistic regression on IAD by age, psychometric measures and internet use habits.

Covariates	β	p-value	OR	95% CI of OR	
				Lower	Upper
1. Neuroticism	1.37	<.0001	3.95	2.58	6.04
2. Life impairment	1.16	<.0001	3.18	2.13	4.75
3. BSRS-5	0.79	0.0003	2.21	1.43	3.42
4.Resilience (0-16)					
0-8	1.10	0.001	3.02	1.62	5.64
9-12	0.49	0.116	1.64	0.89	3.04
5. Internet Activity (0-21)					
0-10	0.11	0.630	1.11	0.73	1.70
14-21	0.71	0.001	2.04	1.33	3.14

Notes: 1. The variables of age, BSRS-5, Neuroticism, life impairment, resilience, internet activity, and internet use time were entered for analysis.
2. Reference groups for each variable: BSRS-5<6; Neuroticism<16; life impairment=No; Internet use time <13; resilience=2 (score=13-16); internet activity=1 (11-13).
3. OR =exp(β).

Symptom profiles and seeking help behavior of subjects with IAD

The IAD-9 performed well in terms of psychometrics in this study. The internal consistency was satisfactory (Cronbach's alpha= .823). Concerning the construct validity, exploratory factor analysis using principal component analysis with Varimax rotation extracted two factors that explained 54.48% of the total variance. The factor I comprised six items: loss of interest in previous hobbies (.744), functional impairment (.730), escaping negative moods (.714), unsuccessful attempt to control (.585), withdrawal symptoms (.572), and continued excessive use despite knowledge of psychosocial problems (.651). Factor II contained three items of preoccupation (.823), tolerance (.743), and deception (.550).

With respect to concurrent validity, the IAD-9 score was significantly correlated with the BSRS-5 score (r=.527, p<.01). Compared to the non-IAD, the IAD individuals had a higher prevalence of psychiatric morbidity (74.6% vs 28.6%; p<.0001) and a significantly higher score in BSRS-5 (10.73±3.83 vs 1.48±2.46, p< .001) and Neuroticism (19.40±6.93 vs 9.59±7.95, p<.001) (Table 2). In terms of the validity of each IAD-9 item to identify IAD, the item responses among the participants were shown in Table 6. The IAD individuals presented with a significantly higher positive-response rate (PRR) for every item than the non-IAD. Among the IAD individuals, except for the deception, the following four items had a PRR greater than 70%: functional impairment (sensitivity=81.7%; specificity=91.7%), uncontrollability (sensitivity=72.1%; specificity=89.9%), withdrawal symptoms (sensitivity=69.2%; specificity=91.7%), and tolerance (sensitivity=91.7, specificity=68.9%). Above all, the odds ratio for IAD was the highest for the item of functional impairment (OR=49.28), followed by withdrawal (OR=24.82), tolerance (OR=24.38) and uncontrollability (OR=22.97). Regarding the insight, 77.1% of the IAD individuals admitted having internet addiction, compared to 24.5% of the non-IAD (p<0.0001 by chi-square test). However, only 16.3% of those with IAD in comparison to 1.6% of the non-IAD sought help from mental health services.

Discussion

Our study was an online self-report survey with convenient samples and mainly focused on the psychometric property of IAD-9 as well as associated suicidality, psychopathology, psychosocial risks, and protective factors of IAD. The findings revealed the prevalence and severity of IAD were significantly associated with the following variables: neuroticism, resilience, general psychopathology, functional impairment, and forms of online activities (Tables 1 and 2). In particular, the IAD individuals reported significantly higher rates of suicidal ideation across different time points.

It has been well recognized that IA has a high comorbidity of psychiatric disorders. Because of lacking consensus on the diagnosis of general IA even though internet gaming disorder is proposed in the section of conditions for further study in DSM-5, the diagnosis based either on clinical interview or psychometrics might be quite different and lead to various prevalence rates in different subpopulations. Accordingly, if we took into consideration of the associated outcome of IAD such as significant psychosocial functioning impairment and psychiatric morbidity, the optimal cutoff points will also be different. For the screening purpose, the authors will suggest changing cutoff thresholds according to the DSM-5 equivalent criteria and conceptual framework.

Based on the measurement of the IAD-9, we found in our previous study that the one-year prevalence of IAD was 1.9% (with 1.2% IGD and 0.7% non-gaming IAD) in the general population, with a predominance in youths aged 15-19. Among the users, 5.3% of the subjects engaging in online games developed IGD, and only 1.5 % of the remaining non-gamers had non-gaming IAD. These findings suggested that addiction to online gaming was one of the key subtypes of internet addiction, particularly among adolescents [37]. The study demonstrated that socio-demographic, and psychopathological factors were associated with IAD, which supports our previous findings on internet users [38]. The estimated prevalence (23.6%) of IAD among internet users in the present study was higher than other online survey data (4-10%) for internet users [39].

Table 4. Pearson's correlation matrix of IAD, BSRS-5, neuroticism, internet activity, internet use time (hours per week) and resilience.

	1	2	3	4	5	6	7	8	9	10	11	12
1. IAD	1											
2. BSRS-5	.527**	1										
3. Insomnia.	.391**	.809**	1									
4. Anxiety.	.465**	.925**	.705**	1								
5. Hostility	.493**	.931**	.679**	.848**	1							
6. Depression	.504**	.941**	.665**	.845**	.875**	1						
7. Inferiority.	.518**	.909**	.644**	.786**	.798**	.847**	1					
8. Suicidal thoughts.	.440**	.813**	.628**	.734**	.760**	.806**	.735**	1				
9. Neuroticism	.580**	.775**	.579**	.697**	.719**	.768**	.726**	.649**	1			
10. Internet Activity	.122**	0.02	0.04	0.02	0.02	0.01	0.02	0.00	.065*	1		
11. Resilience	-.331**	-.480**	-.382**	-.412**	-.446**	-.457**	-.464**	-.501**	-.436**	.084**	1	
12. Internet use time (hour/week)	.165**	.083**	0.06	.085**	.081**	.069*	.076*	0.04	.107**	.196**	-0.04	1

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

Table 5. Multiple regression by stepwise method on internet addiction by demographics, personality, psychopathology, resilience and internet use habits.

Covariates by steps	B	SE	R^2	Adjusted R^2	p-value
Model 1					
1. Neuroticism	.112	.011	.337	.419	<.001
2. Life impairment	.68	.07	.401		<.001
3. Internet Activity	.068	.017	.408		<.001
4. Resilience	-.057	.020	.415		<.001
5. BSRS-5	.043	.017	.419		.012
Model 2 (items of Neuroticism)					
1. Frequently feeling depressed	.336	.107		.353	.002
2. Difficulty concentrating	.586	.090			<.001
3. Intermittent restlessness	.351	.106			.001
4.Distracted attention	.283	.085			.001
5. Inefficient over-thinking	.212	.098			.030
6. Frequently dissatisfied	.271	.109			.013
7. Intermittently feeling lonely	.201	.093			.030
Model 3 (items of BSRS-5)					
1. Inferiority	.608	.078		.284	<.001
2. Hostility	.427	.086			<.001

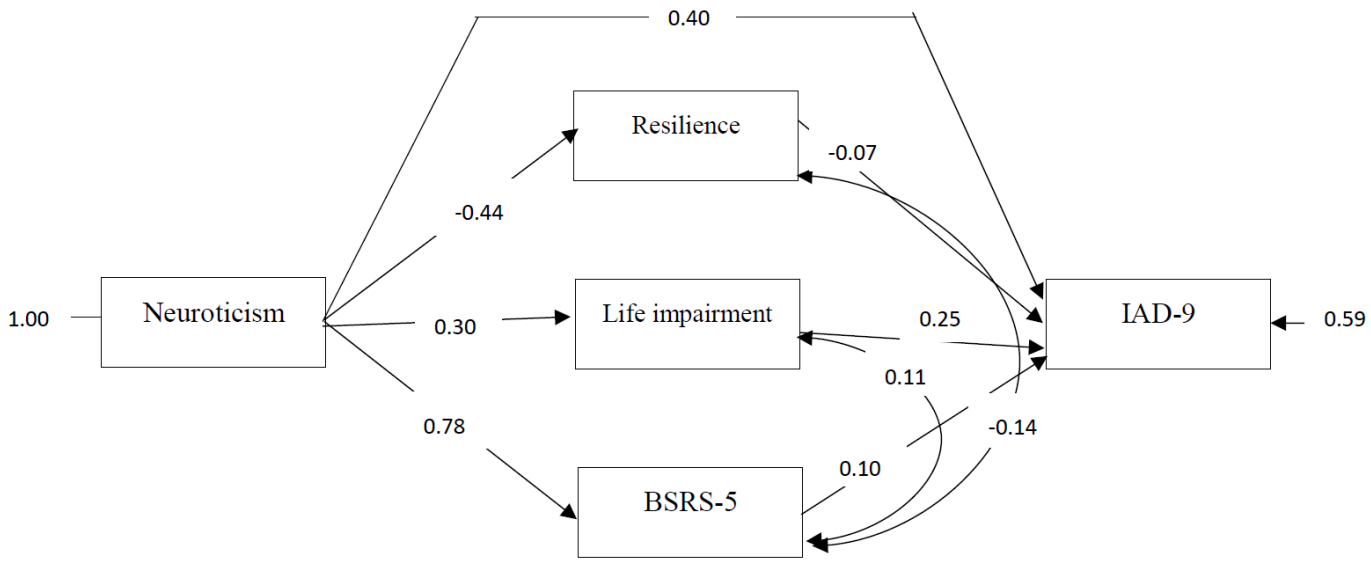

Figure 1. The path analysis with structural equation model for IAD-9 score by neuroticism, resilience, BSRS-5, life impairment (Chi-square=2.61, df=1, p=.106, root mean square error of approximation (RMSEA) =.04, goodness of fit index (GFI)=0.999, comparative goodness of fit index (AGFI) =.999).

Table 6. Distribution of symptom items of internet addictive disorder defined by DSM-5 among the participants (N=1012).

	Total	IAD (n=240) n (%)	Non-IAD (n=772) n (%)	p*	β	p	OR	95% CI of OR	
								Lower	Upper
Preoccupation									
Yes	665 (65.7)	223 (92.9)	442 (57.3)	<0.001	2.28	<.0001	9.79	5.86	16.36
No	347 (34.3)	17 (7.1)	330 (42.7)						
Withdrawal									
Yes	230 (22.7)	166 (69.2)	64 (8.3)	<0.001	3.21	<.0001	24.82	17.06	36.10
No	782 (77.3)	74 (30.8)	708 (91.7)						
Tolerance									
Yes	460 (45.5)	220 (91.7)	240 (31.1)	<0.001	3.19	<.0001	24.38	15.05	39.50
No	552 (54.5)	20 (8.3)	532 (68.9)						
Uncontrollability									
Yes	251 (24.8)	173 (72.1)	78 (10.1)	<0.001	3.13	<.0001	22.97	15.92	33.14
No	761 (75.2)	67 (27.9)	694 (89.9)						
Lack of interest									
Yes	215 (21.2)	154 (64.2)	61 (7.9)	<0.001	3.04	<.0001	20.87	14.40	30.26
No	797 (78.8)	86 (35.8)	711 (92.1)						
Functional impairment									
Yes	260 (25.7)	196 (81.7)	64 (8.3)	<0.001	3.90	<.0001	49.28	32.54	74.64
No	752 (74.3)	44 (18.3)	708 (91.7)						
Deception									
Yes	514 (50.8)	221 (92.1)	293 (38.0)	<0.001	2.95	<.0001	19.02	11.64	31.06
No	498 (49.2)	19 (7.9)	479 (62.0)						
Escape from mental distress									
Yes	161 (15.9)	120 (50.0)	41 (5.3)	<0.001	2.88	<.0001	17.83	11.91	26.70
No	851 (84.1)	120 (50.0)	731 (94.7)						
Continued overuse									
Yes	189 (18.7)	139 (57.9)	50 (6.5)	<0.001	2.99	<.0001	19.87	13.53	29.19
No	823 (81.3)	101 (42.1)	722 (93.5)						

Note: By chi-squared test.

However, consistent with previous reports, adolescents and young adults were significantly more likely than other age groups to develop IAD and/ or IGD [39]. Although a high prevalence of IAD is seen in individuals with ages before 25 and students, it was different from our previous findings that IAD was predominant in people aged 25-44, retired, unemployed, or in status of housewife. That indicated that IAD could occur across ages with different internet usage or life stressors. From a neurocognitive aspect, the different developmental trajectories of brain circuits involved in motivation or control processes could contribute to adolescents' risk-taking behaviors such as excessive online gaming or internet use [40]. Furthermore, some researchers indicated that college students with insecure attachments were vulnerable to developing IAD [3-5, 9]. People can make new friends and get immediate emotional support in the faceless and anonymous cyberspace community, so vulnerable youths are susceptible to addictive behavior.

Regarding types of regular online activity in the study, multiple internet activity users with involvement in online shopping (OR=1.98), online gaming (OR=1.91), online reading (OR=1.75), and video-watching (OR=1.42) were significantly more likely to have IAD. In our previous study on community residents [25], the people who were females aged 45 or older, housewives, and retirees appeared more likely to have non-gaming IAD than did males [25]. Our findings indicated that different forms of online activity showed distinct trends in the development of IAD and supported the conceptualization and framework of IGD criteria as defined in the DSM-5 that it was applicable for the diagnosis of non-gaming IAD in general. However, the subtype of internet activity should be specified in further studies of the underlining mechanisms and interventions [41]. Our findings also demonstrated that engagement in multiple forms of online activity might form the basis for the development of certain subtypes of IAD. It implied that engagement in different online activities through accumulative and adjunctive effects possibly contributed to IAD (e.g., problems with time management) and that the IAD subjects were vulnerably addicted to multiple online activities.

Comparable to the findings of previous studies, the most important psychosocial determinant for IAD in the study was neuroticism by the MPI- neuroticism scale (NS) [2, 7, 42,43]. Neuroticism was characterized by high levels of negative and unstable affect, such as feeling depressed, feeling restless, feeling guilty, mood swings as well as poor concentration or easy distraction. People with a higher N score often experience negative effects when facing minor stressors. IA has been reported to closely link to stressful life events and psychological symptoms [44, 45]. Thus, it was easy to infer the close association between neuroticism and IAD. Our findings particularly pointed out significant associations between individual items of NS and IAD, indicating that problems with concentration, distractibility, moodiness (e.g., feeling restless, inefficient over-thinking and depressed), and feelings of loneliness were important predictors of IAD.

There are much in common for the aforementioned significant predictors for IAD and the symptoms of ADHD (e.g., distractibility, difficult focusing, and restlessness) [20]. Previous reports stated a close link between IA and ADHD or ADHD symptoms [9-11]. Among the manifesting ADHD symptoms, attention deficit was reported as the most associated factor with IA [9, 10]. This study found that both concentration and attention were specifically important factors related to IAD severity. Most previous reports just focused on neuroticism in general and did not highlight the roles of concentration or attention and moodiness in the development of IA.

Concerning psychopathology, the IAD subjects presented with significantly higher rates of psychiatric morbidity and suicidal ideation/attempt than the unaffected. The severity of overall psychological distress based on the BSRS-5 score was significantly correlated with the severity of IAD. Based on the univariate analysis (Table 2), all five symptoms could work together or independently engender IAD. Our findings supported that psychiatric comorbidity in internet addiction was prominent. Among the symptom profile, feelings of inferiority and hostility were two major determinants for the IAD-9 score; inferiority might lead to hostility and destructive consequences. When the feeling of inferiority turns inward, it might manifest as feelings of depression. Unresolved inferiority or hostility might lead to feelings of helplessness and finally to depression and suicide [9]. About one-half of IAD individuals engaged in internet activities to escape or relieve negative moods. The "escapism" from self and reality in internet immersion has been consistently related to both symptoms of addiction and negative outcomes resulting from online gaming [46, 47].

Concerning the protective factor of resilience, the study found that resilience was negatively correlated with the IAD-9 score. It was also identified as one of the significant factors for IAD through regression analysis. The finding was compatible with a previous study on 326 African American university students using a cross-sectional self-report survey, which showed that internet addiction was positively associated with depression, while negatively associated with resilience [19].

Based on our previous and current studies on internet users [38], we are convinced that individuals with high neuroticism and low resilience were most vulnerable to stressful life events or negative moods with high psychological distress and eventually engaged excessively in specific internet activities. This resulted in significant functional impairment and led to internet addiction and suicidality. Multiple regressions showed that neuroticism, life impairment, BSRS-5 score ,and resilience were significant predictors of IAD scores. Neuroticism measured the stable personality traits across the lifetime; whereas the BSRS-5 assessed the psychological distress over the past week. By the time frame, as shown in figure 1, path analysis of the SEM model on IAD revealed that neuroticism could directly influence the severity of IAD-9 as well as indirectly contributed to the general psychological distress (BSRS-5 score), and severity of life impairment, finally worked together to predict IAD score. This model possessed a satisfactory goodness of fit. In this study, neuroticism and BSRS-5 score were highly inter-correlated. Integration of the findings from the present study with the above-mentioned conceptual model made the dynamic development of IAD clearer and more comprehensive.

Suicidality among internet addicts has attracted the

attention of many researchers [17, 48, 49]. In our series of studies, the IAD individuals were observed more likely to suffer from suicidal ideation in the recent week or across the lifetime than the unaffected. Given that IAD has been found to be highly associated with psychiatric morbidity and functional impairments, all these factors were common risks of suicide. In addition, a low level of resilient coping was also reported to have a close relationship with increasing risks of suicidal ideation and attempt [50]. High rates of associated psychiatric morbidity, suicide risks, and lower resilience with low mental health service usage among IAD individuals might contribute to the worldwide trend of increasing suicide mortality for young people. Such findings implied that early detection of high-risk individuals and the provision of timely intervention are crucial for internet users.

The validity of the DSM-5 criteria for IGD was shown to be good in discriminating between IGD subjects and IGD subjects in remission from a control group [10]. Pontes & Griffiths adapted the nine criteria to design a new self-reported scale with good psychometric properties to measure the severity of IGD among gamers [49]. In our previous studies, the IAD-9 administered online or through telephone interviews also demonstrated satisfactory validity in identifying IAD subjects among internet users or the general public. According to the DSM-5 criteria, a diagnostic condition requires clinically significant psychological distress or functional impairment to ensure the credibility of psychiatric disorders. As shown in Tables 3 and 6, the IAD individuals showed higher percentages of psychological distress (e.g., 69% for depression); one-half of them engaged in internet activities to escape or relieve a negative mood; 64.2% lost interest in previous hobbies; 57.9% continued excessive use despite their knowledge about psychosocial problems; approximately 80% suffered from significant functional impairment; 74.6% met the criteria for psychiatric morbidity. Projecting on these findings, we speculate that IAD is a behavioral addictive disorder resulting from maladaptive coping to psychological distress or coexisting psychiatric disorders.

According to both factor analysis results and the validity of IAD-9 (with all sensitivity, specificity, and diagnostic accuracy greater than 80%), four functional domains could significantly identify IAD: functional impairment, uncontrollability, withdrawal, and tolerance. The latter three symptoms are listed in the criteria for gambling disorder and the latter two for substance use disorder as defined in DSM-5. As such, for screening purposes, we propose this 3-item checklist (IAD-3) for early identification of behavioral addiction problems. The additional item functional impairment (with specificity > 90% and factor loadings >.50) could be used as an indicator of severity.

Regarding the symptom distribution of the proposed nine criteria, the IAD might be considered as a continuum or spectrum in terms of severity. Internet users without IAD still presented a varying prevalence of different symptoms, e.g., preoccupation (57.3%), tolerance (31.1%), uncontrollable internet activity (10.1%), and deception (38.0%). It is of great concern that although a majority of the IAD subjects reported psychological distress with functional impairment (81.12%) and positive insight (77.1%) to IAD, a very low proportion (16.3%) of them sought psychiatric treatment. This figure is consistent with the fact that IAD was rarely seen in psychiatric services in Taiwan.

Limitation

Because this study was a cross-sectional online questionnaire survey and the subjects were recruited using a convenience sample, generalization and causal effects of the findings need to be cautious. Future studies are suggested to combine solid and acceptable diagnostic criteria as well as longitudinal design to make comprehensive and integrative formulation to the development of IAD treatment and preventive strategies.

Conclusions

In summary, this online survey using the DSM-5 framework revealed the prevalence and severity of IAD were significantly associated with psychological distress, suicidality, and several psychosocial determinants. We suggested that neuroticism was a major predisposing factor, reacting to stressful life events as a precipitating factor to cause psychological distress. Under triggers of life events, such personality and resilient coping could eventually cause maladaptive coping behaviors through excessive engagement in specific internet activities, which results in internet addiction giving significant life impairment and leading to suicide. All these factors interacted together and progressed to internet addiction. Internet users among adolescents and young adults with maladaptive coping and psychological distress should be the target populations for further interventions and studies. Therefore, earlier identification of individuals at-risk and provision of timely and pertinent treatment or management is necessary for suicide prevention and mental health promotion among internet users. More studies are suggested to investigate the motivations of help-seeking and the awareness of IA risks among the young population.

Acknowledgments

The study was conducted with the assistance of colleagues from the Taiwan Suicide Prevention Center. The researchers are also grateful for all the participants who participated in this online questionnaire survey. We thank the Ministry of Health and Welfare, Executive Yuen, Taiwan, for grant support (M03B2051).

Author Contributions

All authors have read and agreed to the published version of the manuscript.

Funding

This research was funded by the Taiwan Ministry of Health and Welfare, grant number M08B8116.

Conflicts of Interest

The authors declare no conflict of interest.

References

1. Widyanto L, Griffiths M: Internet Addiction': a critical review. Int J Ment Health Addict 2006;4(1):31-51.
2. Young KS: Internet addiction: a new clinical phenomenon and its consequences. Am. Behav Sci 2004;48(4):402-415.
3. Lin MP, Ko HC, Wu JY: Prevalence and psychosocial risk factors associated with internet addiction in a nationally representative sample of college students in Taiwan. Cyberpsychol. Behav Soc Netw 2011;14(12):741-746.
4. Moreno MA, Jelenchick L, Cox E, et al: Problematic internet use among US youth: a systematic review. Arch Pediatr Adolesc Med 2011;165(9):797-805.
5. Müller KW, Glaesmer H, Brähler E, et al: Prevalence of internet addiction in the general population: results from a German population-based survey. Behav Inform Technol 2013;33(7):757-766.
6. Fu KW, Chan WS, Wong PW,et al: Internet addiction: prevalence, discriminant validity and correlates among adolescents in Hong Kong. Br J Psychiatry 2010;196(6): 486-492.
7. Kuss DJ, Griffiths MD, Karila L, et al: Internet addiction: a systematic review of epidemiological research for the last decade. Curr Pharm Des 2014;20(25):4026-4052.
8. Spada MM: An overview of problematic internet use. Addict Behav 2014;39(1):3-6.
9. Yen JY, Ko CH, Yen CF, et al: The comorbid psychiatric symptoms of internet addiction: attention deficit and hyperactivity disorder (ADHD), depression, social phobia, and hostility. J Adolesc Health 2007;41(1):93-98.
10. Ko CH, Yen JY, Yen CF, et al: The association between Internet addiction and psychiatric disorder: a review of the literature. Eur Psychiatry 2012;27(1):1-8.
11. Gundogar A, Bakim B, Ozer OA, et al: The association between internet addiction, depression and ADHD among high school students. Eur Psychiatry 2012;27:1.
12. Yang L, Sun L, Zhang Z, et al: Internet addiction, adolescent depression, and the mediating role of life events: finding from a sample of Chinese adolescents. Int J Psychol 2014;49(5):342-347.
13. Dalbudak E, Evren C, Aldemir S, et al: Relationship of internet addiction severity with depression, anxiety, and alexithymia, temperament and character in university students. Cyberpsychol. Behav Soc Netw.2013a;16(4):272-278.
14. Dalbudak E, Evren C, Topcu M, et al: Relationship of internet addiction with impulsivity and severity of psychopathology among Turkish university students. Psychiatry Res 2013b;210(3):1086-1091.
15. Aydm B, Sa SV: Internet addiction among adolescents: the role of self-esteem. Proced Soc Behav Sci 2011;15:3500-3505.
16. Lee HW, Choi JS, Shin YC, et al: Impulsivity in internet addiction: a comparison with pathological gambling. Cyberpsychol Behav Soc Netw 2012;15(7):373-377.
17. Lin IH, Ko CH, Chang YP, et al: The association between suicidality and internet addiction and activities in Taiwanese adolescents. Compr Psychiatry 2014;55(3):504-510.
18. Kim K, Ryu E, Chon MY, et al: Internet addiction in Korean adolescents and its relation to depression and suicidal ideation: a questionnaire survey. Int. J. Nur. Stud. 2006;43(2):185-192.
19. Jin SW, Jones TV, Lee Y: Does resilience mediate the link between depression and Internet addiction among African American university students? J Negro Educ 2019;88(2) : 114-129.
20. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders: DSM-5, fifth ed. Washington, D.C: American Psychiatric Association, 2013.
21. World Health Organization . International Statistical Classification of Diseases and Related Health Problems (ICD-11): New Release. World Health Assembly; Geneva, Switzerland: 2019. [(accessed on 26 May 2019)]. Available online: https://www.who.int/news-room/detail/25-05-2019-world-health-assembly-update
22. Rumpf HJ, Vermulst AA, Bischof A, et al: Occurence of internet addiction in a general population sample: a latent class analysis. Eur Addict Res 2014;20(4):159-166.
23. Müller KW, Dreier M, Beutel ME, et al: A hidden type of internet addiction? Intense and active use of social networking sites in adolescents. Comput Hum Behav 2016;55:172-177.
24. Tsitsika AK, Tzavela EC, Janikan M,et al: Online social networking in adolescence: patterns of use in six European countries and links with psychosocial functioning. J Adolesc Health 2014;55(1):141-147.
25. Wu CY, Lee MB, Liao SC, et al: A nationwide survey of the prevalence and psychosocial correlates of internet addictive disorders in Taiwan. J Formos Med Assoc 2019;118:514-523.
26. Ko CH, Yen JY, Chen SH, Wang PW, Chen CS, Yen CF. Evaluation of the diagnostic criteria of internet gaming disorder in the DSM-5 among young adults in Taiwan. J. Psychiatr. Res. 2014;53:103-110.
27. Lee MB, Liao SC, Lee YJ, Wu CH, Tseng MC, Gau SF, Rau CL. Development and verification of validity and reliability of a short screening instrument to identify psychiatric morbidity. J. Formos. Med. Assoc. 2003;102:687-694.
28. Lung FW, Lee MB: The five-item Brief-Symptom Rating Scale as a suicide ideation screening instrument for psychiatric inpatients and community residents. BMC Psychiatry, 2008;8:53.
29. Lee JL, Lee MB, Liao SC, et al: Prevalence of suicidal ideation and associated risk factors in the general population. J Formos Med Assoc 2010;109(2):138-147.
30. Wu CY, Lee MB, Liao SC, et al: Psychological distress of suicide attempters predicts one-year suicidal deaths during 2007-2016: a population-based study. J Formos Med Assoc 2020;119(8), 1306-1313.
31. Eysenck HJ: The Maudsley Personality Inventory. Manual. San Diego, CA: Educational & Industrial

Testing Service, 1962.
32. Sinclair VG, Wallston KA: The development and psychometric evaluation of the Brief Resilient Coping Scale. Assessment 2004;11(1):94–101.
33. Limonero JT, Tomás-Sábado J, Gómez-Romero MJ, et al: Evidence for validity of the Brief Resilient Coping Scale in a young Spanish sample. Span J Psychology 2014;17:E34.
34. Kocalevent RD, Zenger M, Hinz A, et al: Resilient coping in the general population: standardization of the brief resilient coping scale (BRCS). Health Qual Life Outcomes 2017;15(1):251.
35. Fung S: Validity of the Brief Resilience Scale and Brief Resilient Coping Scale in a Chinese sample. Intern J Environ Res Publ Health 2020;17(4):1265.
36. Wu CY, Lee MB, Lin C, et al: A longitudinal study on psychological reactions and resilience among young survivors of a burn disaster in Taiwan 2015–2018. J Advan Nurs 2020;76(2):514–525.
37. Ko CH, Yen JY, Yen CF, et al: Factors predictive for incidence and remission of internet addiction in young adolescents: a prospective study. Cyberpsychol Behav Soc Netw 2007;10(4):545-551.
38. Wu CY, Lee MB, Liao SC, et al: Risk factors of internet addiction among internet users: an online questionnaire survey. PLoS One 2015;10(10):e0137506.
39. Cheng C, Li AY: Internet addiction: prevalence and quality of (real) life: a meta-analysis of 31 nations across seven world regions. Cyberpsychol Behav Soc Netw 2014;17(12): 755-760.
40. Gladwin T E, Figner B, Crone EA, et al: Addiction, adolescence, and the integration of control and motivation. Dev Cogn Neurosci 2011;1(4):364-376.
41. Young KS: Internet addiction: the emergence of a new clinical disorder. Cyberpsychol Behav Soc Netw 1998;1:237-244.
42. Dong G, Wang J, Yang X, et al: Risk personality traits of internet addiction: a longitudinal study of internet-addicted Chinese university students. Asia Pac Psychiatry 2013;5:316-21.
43. Muller KW, Koch A, Dickenhorst U, et al: Addressing the question of disorder-specific risk factors of internet addiction: a comparison of personality traits in patients with addictive behaviors and comorbid internet addiction. Biomed Res Int. 2013;2013:546342.
44. Yan W, Li Y, Sui N: The relationship between recent stressful life events, personality traits, perceived family functioning and internet addiction among college students. Stress Health. 2014;30:3-11.
45. Tang J, Yu Y, Du Y, et al: Prevalence of internet addiction and its association with stressful life events and psychological symptoms among adolescent internet users. Addict Behav. 2014;39:744-747.
46. Kwon JH, Chung CS, Lee J: The effects of escape from self and interpersonal relationship on the pathological use of internet games. Comm Ment Health J 2011;47(1):113-121.
47. Kardefelt-Winther D: The moderating role of psychosocial well-being on the relationship between escapism and excessive online gaming. Comput Hum Behav 2014;38:68-74.
48. Durkee T, Hadlaczky G, Westerlund M, et al: Internet pathways in suicidality: a review of the evidence. IJERPH. 2011;8(10):3938-3952.
49. Park S, Hong KE, Park EJ, et al: The association between problematic internet use and depression, suicidal ideation and bipolar disorder symptoms in Korean adolescents. Aust NZ J Psychiatry 2013;47(2):153-159.
50. Sher L: Resilience as a focus of suicide research and prevention. Acta Psychiatr Scand 2019;140(2):169-180. DOI: 10.1111/acps.13059
51. Pontes HM, Griffiths MD: Measuring DSM-5 internet gaming disorder: development and validation of a short psychometric scale. Comput Hum Behav 2015;45: 137-143.

Original Articles

The Profile of Online Suicide News Reports and Its implications for Suicide Prevention: A Nationwide Media Surveillance Study During 2012-2021 in Taiwan

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Abstract: ***Objective:*** The media plays an important role in suicide prevention. Online media has become the major source of suicide information for the general public, and its positive or negative influences will cause imitation effects. This study aimed to: 1) analyze the contents and trend of online suicide reports from the media reporters' viewpoints and investigate its potential impacts on suicide among the public; 2) examine the relationship between the profile of suicide news and national suicide data, and 3) evaluate the impact of Suicide Prevention Act enacted on June 19, 2019. ***Method:*** The Taiwan Suicide Prevention Center (TSPC) monitored online daily news published on the websites of four major Taiwanese media companies from January 1, 2012, to December 31, 2021. Suicide incident reports and the reported suicide cases were coded according to the standardized method. Z test and Poisson distribution analyses were performed to compare the rates of reporting suicide methods and the trend of the annual rate changes. ***Results:*** In total, 10,426 reports were collected during the research period. Overall, more than 95% of suicide news mentioned suicide methods. The profiles of the suicide reports were analyzed and compared between two time slots (2012-2016 and 2017-2021). During 2012-2016, the top three suicide methods reported were falling from height (1,368 people, 22.2%), charcoal burning (1182 people, 19.2%), and suicide by drowning (867 people, 14.1%). During 2017-2021, the three frequently reported suicide methods were falling from height (1,188 people, 27.8%), suicide by drowning (874 people, 20.4%), and charcoal burning (552 people, 12.9%). Notably, the rate of falling from height steadily increased over the past decade in Taiwan. The possible copycat effects on the female's suicide using this lethal method were discussed. ***Conclusion:*** The online media selected specific suicide methods to report in the news. Although the National Suicide Prevention Act had reduced the overall media reports on suicide, falling from height was still the most common method reported in online news over the past decade. The potential latent copycat effects triggered by online media reports among the individuals at risk of suicide need to be highlighted and further investigated.

Keywords: Suicide prevention, profile, suicide news report, online media, Copycat, Taiwan.

(Journal of Suicidology 2022; 17(4): 376-386. DOI:10.30126/JoS.202212_17(4).0006)

Introduction

The media plays an indispensable role in suicide prevention. It is one of the channels for the public to contact suicide-related issues and an essential medium for national strategy advocacy. For print media coverage, the number of reported suicide deaths was associated with increased suicide mortality over a subsequent period [1]. On the contrary, appropriate media reports can help promote suicide prevention and help-seeking behavior. There is no doubt that media reporting on suicide plays an integral part in suicide prevention [2]. It could be a risk factor or a protective factor for suicidal behavior [3,4]. When the media reported suicide exaggeratedly and overly detailed, significantly increased suicidal behavior were noted [5]. Similarly, repeated reports about suicide displayed on the front page of newspapers had negative impacts. Reports highlighting details of suicide and glorifying suicidal behaviors could increase the number of subsequent suicide attempts in vulnerable populations [6]. Moreover, inappropriate media reporting of celebrities or other high-profile cases led to increased suicide rates in the general population [7]. Therefore, Taiwan Suicide Prevention Center (TSPC) has been monitoring media reporting on suicide for decades, including daily monitoring of media reporting on suicide and giving timely feedback to the media for inappropriate reporting [8].

In recent years, information on the Internet has been flooded due to the ubiquity of network information transmission and the advent of the era of information explosion. Any information posted on the Internet may be read and imitated immediately. The influence of reprinting news online surpassed traditional media. The media always tries to increase click-through and reaches rates to increase traffic and advertisers' publication efficiency. Hence, online media sometimes uses

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Received: 21 November 2022; **Accepted:** 16 December 2022.

sensational news headlines, pictures, or serial reports to achieve this. The primary purpose, however, runs counter to suicide prevention. There was a lot of solid evidence to support the argument that sensationalized suicide news leads to subsequent suicides, which would not have happened without inappropriate media coverage [9].

The TSPC is well aware of the importance of suicide media reporting on suicide prevention. Therefore, since 2006, it has collected and compiled suicide-related news reports daily for close observation. It is hoped that the results of media monitoring will provide media practitioners with suggestions for writing suicide issues. In a previous study, the research team analyzed 5529 print reports and 16,445 person-event items from online media and found that the number of suicide reports in print newspapers markedly decreased while that of online media increased. The results indicated that media reporting of suicide significantly improved in most WHO guideline items except one item, "Do not publish photos or suicide notes" [2]. It is unknown about the profile of online media reports of suicide and its trend over the past decade. Furthermore, When South Korea enacted the suicide prevention law in 2012, it reduced the Werther effect from celebrity suicides and resulted in a downward trend in average daily suicide deaths by month [30]. It would be critical to evaluate whether the reporting trend would be changing before and after a period of law enforcement. This study aimed to 1) analyze the trend in contents of online suicide reports during 2012-2020 from the media's perspective and investigate its potential impacts on suicide among vulnerable individuals, 2) look into the relationship between the profile of suicide news and the national suicide data and 3) examine the associated impact of the Suicide Prevention Act enacted on June 19, 2019.

Methods

Study design and data collection

Media reporting of suicide has been under surveillance by trained staff of the TSPC and its associated experts for over a decade. In 2006, the TSPC published and promoted the Chinese version of the WHO guidelines for responsible media reporting of suicides. Since 2010, regular surveillance was performed including daily monitoring of media reporting on suicide and giving timely feedback to the media to improve the quality of reports. Moreover, to enhance quality suicide reporting, the TSPC has held annual on-site interactive meetings with major media companies since 2014. This study used the surveillance data to monitor daily reports published on the websites of four major Taiwanese media companies (China Times, Liberty Times, United Daily, and Apple Daily) from January 1, 2012, to December 31, 2021. Suicide incident reports and the reported suicide cases published by the media were coded item by item, including age, gender, suicide status, suicide reason, suicide method, suicide location, and other information about the case [25].

Statistical analysis

Data were analyzed through available sources of news reports online daily. Descriptive statistics were used for the total number of suicide news reports per month. Z test was used to compare the difference in the rates of related variables between different periods. In order to estimate the impact and trend of the media report on jumping, Poisson distribution analysis was performed to determine the trend of report rates of jumping from heights over 10 years.

Results

Trends in contents of online suicide reports from the journalists' perspective

During the study period from January 1, 2012, to December 31, 2021, we collected suicide reports on the Internet from the four major media. The data were intercepted. A total of 10,426 suicide cases were published in news reports. As Table 1 showed, the demographic information was displayed in two periods (2012-2016 and 2017-2020). With regards to 2012-2016, there were 3,700 males (60.2%), 2,387 females (38.8%), and 40 unknown genders (0.7%). The male to female ratio was around 1.5:1. The highest percentage of people aged 25 to 45, with 2,294 people (37.3%), followed by 46 to 64 years old, with 1,594 people (25.9%). From 2017 to 2021, there were 2,549 males (59.6%), 1,674 females (39.1%), and 46 unknown (1.1%). The highest percentage of people aged 25 to 45 , with 1,367 people (32%), followed by 46 to 64 year-olds, with 1,052 people (24.6%). Only 1.4% of the cases were categorized as celebrities . The demographic statistics during the two periods were similar.

Regarding the information about suicidal behavior (Table 2), most of the time, the type of suicide involved personal suicide (82.3% during 2012-2016; 87.2% during 2017-2021) and happened in residential areas (42.3% during 2012-2016; 34.4% during 2017-2021). Table 2 compares the different types and locations of suicide reported by online media in two different time periods, and there are statistically significant differences. For example, the number of reports in 2012-2016 has a higher rate of only suicidal ideation than that in 2017-2021. In 2017-2021, the reported suicide locations in public buildings and watersides were higher than in 2012-2016. With respect to methods of suicide (Table 3 & Figure 1), the top three suicide methods were falling from height (1,368 people, 22.2%), charcoal burning (1182 people, 19.2%), and suicide by drowning (867 people, 14.1%) during 2012-2016; during 2017-2021, the top three suicide methods were falling from height (1,188 people, 27.8%), suicide by drowning (874 people, 20.4%), and charcoal burning (552 people, 12.9%). There was a ranking swapping between "charcoal-burning" and "drowning" while comparing the two time periods.

Relationship between the profile of suicide news and the national suicide data

Regarding the reasons for suicide (Table 4), a wide range of issues were reported with the most common in 2017-2021 involving relational problems 27.6%) such as romantic relations (11.6%), family issues (7.6%), couple conflict (6.8%) and other interpersonal issues (1.6%);

Table 1. Comparison of basic case information reported in the online media from 2010 to 2016 (N=6150) and 2017 to 2021 (N=4276) in Taiwan.

Variable	2010-2016 n (%)	2017-2021 n (%)
Identity		
Unknown	184 (3.0)	59 (1.4)
Layperson	5877 (95.6)	4157 (97.2)
Celebrity	89 (1.4)	60 (1.4)
Gender		
Unknown	40 (0.7)	46 (1.1)
Male	3700 (60.2)	2549 (59.6)
Female	2387 (38.8)	1674 (39.1)
Collection (indistinguishable)	23 (0.4)	7 (0.2)
Age		
Unknown	880 (14.3)	829 (19.4)
Under 14 years old	62 (1.0)	37 (0.9)
15-24 years old	736 (12.0)	520 (12.2)
25-45 years old	2294 (37.3)	1367 (32)
46-64 years old	1594 (25.9)	1052 (24.6)
Over 65 years old	584 (9.5)	471 (11)

mental health problems (16.4%). The ranking order of percentage for every item of reason looked similar in two periods. A closer analysis of the changes in suicide methods from 2010 to 2021 (Table 5-1 & 5-2) showed that the number and percentage of reported suicide cases related to "alcohol or drugs", "wrist cutting", "drowning", and "guns and explosives" had decreased statistically, while " hanging", "suffocation", "charcoal burning" and "gas" had increased. The annual change reached statistical significance by Poisson distribution analysis. Evidently, the rates of falling from height and drowning have significantly increased over the years, while rates of charcoal burning have decreased. The distribution of the three rates was similar to the recent profile of the national suicide mortality data (Appendix 1). In particular, among the national mortality profile, the rate of jumping from height increased more dramatically in females than males and reached the top method of suicidal death (Appendix 1). Moreover, it was evident that the rate was highest in females aged 15 to 24 compared to other age groups (Appendix 2).

Impact of the Suicide Prevention Act

Compared to the period before the release of the Suicide Prevention Act in 2019, the number of news stories about suicide significantly decreased (n=1257 in 2018; n= 753 in 2019; n=562 in 2020, n=596) (Table 5-2). However, as Figure 2 showed, the percentage trend of suicide reports of falling from height steadily increased year-on-year from 2010-2021 ; 15.4% in 2010 and 32.4% in 2021. There was no gender difference in the rate of reported jumping from height.

Discussion

To our knowledge, this is the first study to examine the suicidality profile of online suicide news coverage from the journalists' perspective. During 2012-2016, the top three suicide methods in the news were falling from height, charcoal burning, and drowning. During 2017-2021, the top three suicide methods in the news were falling from height, drowning, and charcoal burning. The most common suicide methods in Taiwan during 2012-2020 were hanging, charcoal burning, falling from height or pesticide intoxication, and drowning accordingly.

The reason for such a difference probably is that the prominent suicide methods in the media (falling from heights and drowning) are all outdoors, which are more eye-catching, and easy to attract people's attention. Besides, one of the reasons why jumping suicide was more likely to be reported could be related to the high rates of jumping in young age group, and youth suicide was more likely to be reported than older age suicide, based on the age differences in favored methods of suicide in Taiwan.[31]. Also, the ranking of suicide news related to charcoal burning shifted from 2nd place to 3rd place probably after we had appealed to the news media to comply with WHO 6 "don't" in Taiwan for years; the media less reported the detailed story of charcoal burning[2]. Even though falling from height was still ranked 1st among suicide reports, the reported numbers have decreased since 2018 (Figure 2). There are some possible reasons why the press tended to cherry-pick specific suicide news. There is no doubt that economic pressure influences news publications. With increasing competition for consumer attention and advertising, media production is now largely audience-oriented and commercial, focusing on events with broad audience appeal [10]. News production is a commercialized business [11]. Values that make an event newsworthy include timeliness, proximity to the target consumer, appeal to human interest, currency (trending issues), prominence, significance, unusualness, and conflict element content [12]. To capitalize on the click-through rate and remain competitive and cost-effective, media companies often focus on producing exclusive and sensational news, with reporters working under intense time constraints and editors making quick decisions on

Table 2. Comparison of information about suicidal behavior of individual cases reported in the online media from 2012 to 2016 (N=4276) and 2017 to 2021 (N=6150) (continued).

Variable	2012-2016 n (%)	2017-2021 n (%)	Z test
Type of suicide			
Unknown	207 (3.4)	118 (2.8)	0.381
Suicide pact	409 (6.7)	248 (5.8)	0.358
Individual suicide alone	5062 (82.3)	3727 (87.2)	<0.001
Suicide after murder	165 (2.7)	76 (1.8)	0.36
Suicide after attempting to kill husband	-	1 (0)	
Suicide after killing family member(s)	224 (3.6)	87 (2)	0.285
Mass suicide	-	1 (0)	
Suicidal ideation only	387 (6.3)	4 (0.1)	<0.01
Suicide after injuring someone	-	1 (0)	
Suicide with children	-	13 (0.3)	
Suicide scene (multiple choice)			
Unknown	207 (3.4)	198 (4.6)	0.33
Residence	2599 (42.3)	1471 (34.4)	<0.001
Inside the car	453 (7.4)	396 (9.3)	0.243
Hotel	218 (3.5)	97 (2.3)	0.331
Workplace	137 (2.2)	106 (2.5)	0.394
School	164 (2.7)	125 (2.9)	0.397
Public buildings/public places	531 (8.6)	671 (15.7)	<0.001
Railway or subway station	150 (2.4)	96 (2.2)	0.397
Bridge	273 (4.4)	356 (8.3)	0.05
Waterside	726 (11.8)	816 (19.1)	<0.001
Suburbs/inaccessible places	204 (3.3)	273 (6.4)	0.111
Barrack	29 (0.5)	23 (0.5)	0.399
Other	272 (4.4)	47 (1.1)	0.097

Table 3. Methods of suicide reported in online news in two periods: 2010 to 2016 (N=6150) and 2017 to 2021 (N=4276) in Taiwan.

Variable	2010-2016 n (%)	2017-2021 n (%)	Z test
Unknown	292 (4.7)	312 (7.3)	<0.001
Medication	348 (5.7)	185 (4.3)	<0.001
Pesticide	167 (2.7)	60 (1.4)	<0.001
Chemical cleaners	47 (0.8)	42 (1)	0.141
Alcohol or Injecting drugs	41 (0.7)	24 (0.6)	0.2670
Sharp weapon	586 (9.5)	366 (8.6)	0.0580
Hanging	634 (10.3)	341 (8)	<0.001
Suffocation	71 (1.2)	16 (0.4)	<0.001
Drowning	867 (14.1)	874 (20.4)	<0.001
Falling from heights	1368 (22.2)	1188 (27.8)	<0.001
Charcoal-burning	1182 (19.2)	552 (12.9)	<0.001
Household gas	124 (2.0)	87 (2)	0.5000
Car exhaust	62 (1.0)	52 (1.2)	0.1660
Self-immolation	209 (3.4)	173 (4)	0.0540
Guns and Explosives	157 (2.6)	103 (2.4)	0.2610
Lying or jumping on railroad tracks	144 (2.3)	86 (2)	0.1510
Others	227 (3.7)	60 (1.4)	0.0000

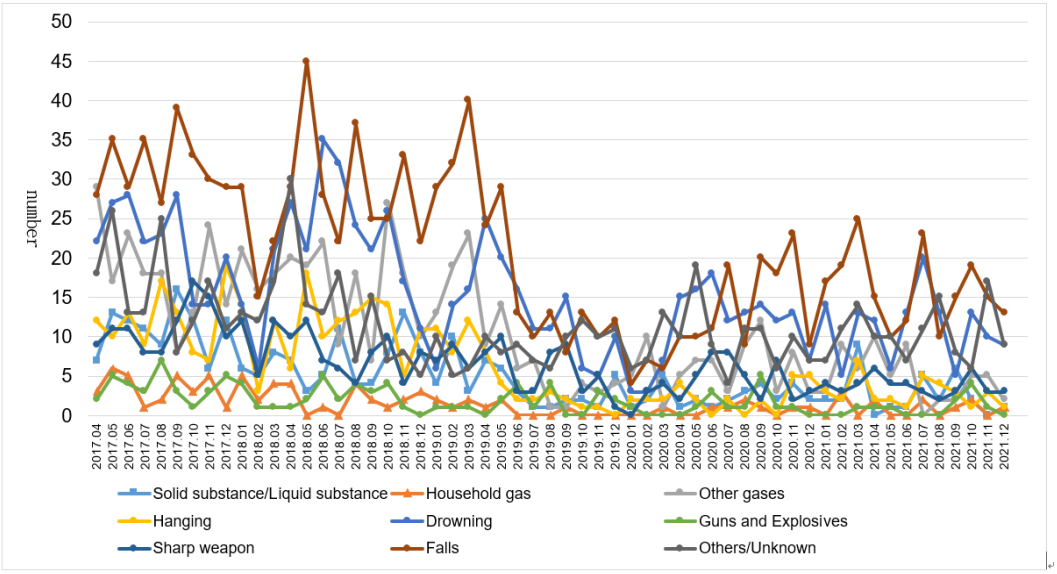


Figure 1. Monthly media coverage of suicide methods in online news reports during 2017 and 2021.

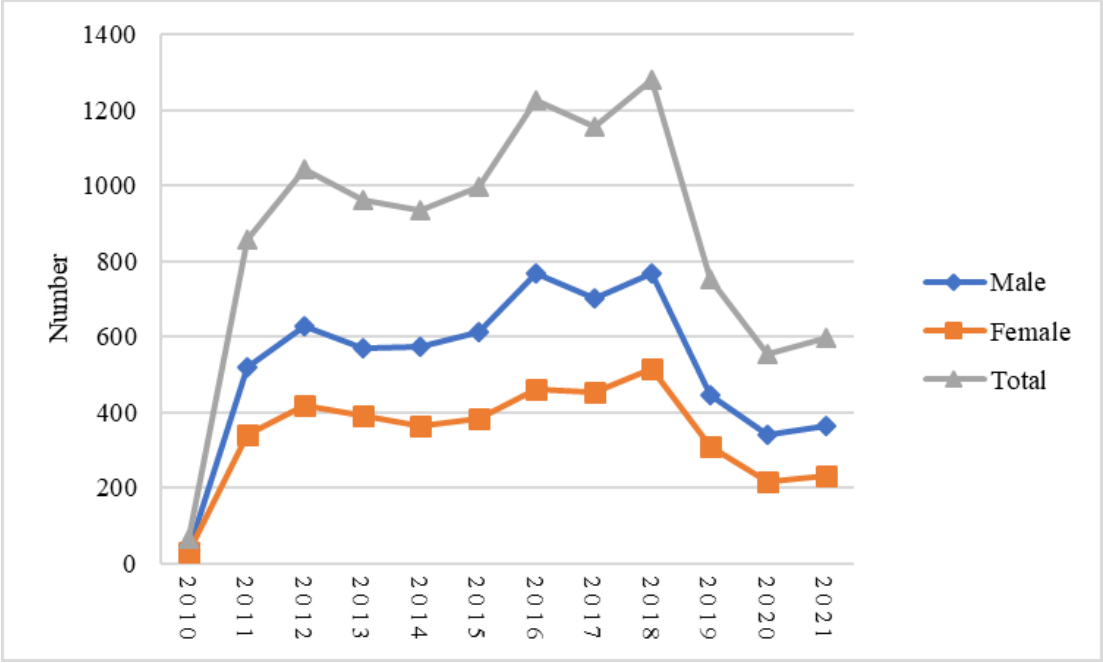
Table 4. Reasons of suicide in cases reported in online news from 2010 to 2016 (N=6150) and 2017 to 2021 (N=4276) in Taiwan.

Variable	2010-2016 n (%)	2017-2021 n (%)	Z test
Reason category (multiple choice)			
Emotions / Relationships			
Family issues	667 (10.8)	327 (7.6)	0.096
Couples issues	557 (9.1)	291 (6.8)	0.194
Romantic relationship issues	1001 (16.3)	496 (11.6)	<0.05
Major loss	192 (3.1)	119 (2.8)	0.394
Peer pressure	57 (0.9	24 (0.6)	0.395
Workplace interpersonal issues	35 (0.6)	15 (0.4)	0.397
Interpersonal issues other than the above	82 (1.3)	53 (1.2)	0.398
Mental health/substance abuse			
Depressed tendencies	193 (3.1)	173 (4)	0.358
History of depressive disorder	655 (10.7)	296 (6.9)	0.055
Non-depressive mental illness	287 (4.7)	190 (4.4)	0.394
Substance abuse	154 (2.5)	47 (1.1)	0.31
Work/economics			
Unemployment	346 (5.6)	150 (3.5)	0.223
Debt	436 (7.1)	238 (5.6)	0.295
Economic factors other than the above	370 (6.0)	209 (4.9)	0.34
Physical disease			
Prolonged illness	598 (9.7)	311 (7.3)	0.181
Non-protracted illness	123 (2.0)	72 (1.7)	0.394
Academic stress	96 (1.6)	38 (0.9)	0.375
Work stress	170 (2.8)	104 (2.4)	0.391
Military service stress	16 (0.3)	7 (0.2)	0.399
Legal issues			
Litigation	93 (1.5)	27 (0.6)	0.359
Legal factors other than the above		33 (0.8)	
Suicide by fear of crime	192 (3.1)	74 (1.7)	0.309
Persecution			
Debt collection violence	20 (0.3)	4 (0.1)	0.397
Sexually assaulted events	38 (0.6)	9 (0.2)	0.391
Sexually molested events		3 (0.1)	
Suffered from fraud	15 (0.2)	9 (0.2)	0.399
Bullying	24 (0.4)	15 (0.4)	0.399
Others	436 (7.1)	141 (3.3)	0.059
Unknown	1202 (19.5)	1583 (37)	<0.001

Table 5. Changes in suicide methods by year in the online news reports during 2010 and 2021 (N=6150) in Taiwan.

	2010 (n=65)	2011 (n=880)	2012 (n=1058)	2013 (n=971)	2014 (n=936)	2015 (n=997)	2016 (n=1243)	2017 (n=1108)	2018 (n=1257)	2019 (n=753)	2020 (n=562)	2021 (n=596)	Total (n=4276)	Rate ratio
Methods (multiple choice)														
Unknown	10 (15.4)	89 (10.1)	65 (6.1)	32 (3.3)	25 (2.7)	21 (2.1)	50 (4.0)	58 (5.2)	72 (5.7)	52 (6.9)	52 (9.3)	78 (13.1)	312 (7.3)	0.92 (0.9-0.96)***
Medication(Solid substance)	10 (15.4)	57 (6.5)	67 (6.3)	62 (6.4)	47 (5.0)	43 (4.3)	62 (5.0)	57 (5.1)	59 (4.7)	29 (3.9)	19 (3.4)	21 (3.5)	185 (4.3)	1.01 (0.94-1.07)
Pesticide	3 (4.6)	24 (2.7)	37 (3.5)	36 (3.7)	23 (2.5)	20 (2.0)	24 (1.9)	21 (1.9)	16 (1.3)	9 (1.2)	7 (1.2)	7 (1.2)	60 (1.4)	0.98 (0.91-1.05)
chemical cleaners(Liquid substance)	4 (6.2)	5 (0.6)	14 (1.3)	3 (0.3)	3 (0.3)	11 (1.1)	7 (0.6)	20 (1.8)	7 (0.6)	6 (0.8)	5 (0.9)	4 (0.7)	42 (1)	1 (0.98-1.02)
Alcohol or drugs	1 (1.5)	5 (0.6)	10 (0.9)	9 (0.9)	3 (0.3)	3 (0.3)	10 (0.8)	6 (0.5)	8 (0.6)	5 (0.7)	0 (0)	5 (0.8)	24 (0.6)	0.97 (0.95-0.99)**
Sharp weapon(Wrist cutting)	7 (10.8)	80 (9.1)	93 (8.8)	105 (10.8)	101 (10.8)	98 (9.8)	102 (8.2)	102 (9.2)	98 (7.8)	72 (9.6)	49 (8.7)	45 (7.6)	366 (8.6)	0.9 (0.85-0.96)**
Hanging	3 (4.6)	92 (10.5)	117 (11.1)	103 (10.6)	102 (10.9)	112 (11.2)	105 (8.4)	106 (9.6)	127 (10.1)	52 (6.9)	26 (4.6)	30 (5)	341 (8)	1.07 (1.05-1.08)***
Suffocation	1 (1.5)	11 (1.2)	16 (1.5)	9 (0.9)	15 (1.5)	10 (1.0)	9 (0.7)	2 (0.2)	6 (0.5)	4 (0.5)	0 (0)	4 (0.7)	16 (0.4)	1.05 (1.04-1.06)***
Drowning	2 (3.1)	100 (11.4)	143 (13.5)	129 (13.3)	138 (14.7)	139 (13.9)	216 (17.4)	198 (17.9)	255 (20.3)	155 (20.6)	133 (23.7)	133 (22.3)	874 (20.4)	0.96 (0.95-0.97)***
Falling from heights	10 (15.4)	158 (18.0)	198 (18.7)	213 (21.9)	210 (22.4)	241 (24.2)	338 (27.2)	284 (25.6)	332 (26.4)	233 (30.9)	146 (26)	193 (32.4)	1188 (27.8)	0.99 (0.95-1.03)
Charcoal burning	12 (18.5)	182 (20.7)	225 (21.3)	185 (19.1)	201 (21.5)	185 (18.6)	192 (15.4)	152 (13.7)	193 (15.4)	96 (12.7)	64 (11.4)	47 (7.9)	552 (12.9)	1.06 (1.01-1.13)*
Gas	1 (1.5)	22 (2.5)	24 (2.3)	21 (2.2)	19 (2.0)	21 (2.1)	16 (1.3)	31 (2.8)	28 (2.2)	9 (1.2)	8 (1.4)	11 (1.8)	87 (2)	1.04 (1.01-1.07)**
Carexhaust	1 (1.5)	8 (0.9)	3 (0.3)	11 (1.1)	7 (0.7)	18 (1.8)	14 (1.1)	12 (1.1)	13 (1)	8 (1.1)	8 (1.4)	11 (1.8)	52 (1.2)	1 (0.97-1.04)
Self-immolation	3 (4.6)	28 (3.2)	39 (3.7)	24 (2.5)	31 (3.3)	34 (3.4)	50 (4.0)	42 (3.8)	47 (3.7)	26 (3.5)	32 (5.7)	26 (4.4)	173 (4)	0.99 (0.95-1.03)
Guns and explosives	1 (1.5)	26 (3.0)	24 (2.3)	18 (1.9)	23 (2.5)	34 (3.4)	31 (2.5)	33 (3)	28 (2.2)	19 (2.5)	14 (2.5)	9 (1.5)	103 (2.4)	0.93 (0.9-0.96)***
Lying on railroad tracks	1 (1.5)	26 (3.0)	27 (2.6)	27 (2.8)	16 (1.7)	16 (1.6)	31 (2.5)	24 (2.2)	14 (1.1)	17 (2.3)	23 (4.1)	8 (1.3)	86 (2)	0.99 (0.95-1.03)
Others	2 (3.1)	35 (4.0)	41 (3.9)	37 (3.8)	24 (2.6)	37 (3.7)	51 (4.1)	17 (1.5)	18 (1.4)	8 (1.1)	8 (1.4)	9 (1.5)	60 (1.4)	0.93 (0.9-0.96)***

Note: By Poisson distribution analysis ; ***p<0.001, **p<0.01, *p<0.05



*(Excluding duplicate reports of the same event)
Figure 2. Sex difference in online suicide reports by falling from heights during 2012 and 2021.

sensitive issues [13]. The stories are often simplified and personified to make them understandable and relatable to the general public [14]. Therefore, newsworthy suicide stories commonly involved public figures, vulnerable populations, public locations, violent or unusual methods, or critical social issues that impacted the community [15]. In the end, the news usually focused on the death event rather than the factors leading to the suicide [16]. Journalists were generally careful with the topic of suicide and mental illness. They struggled to balance public and private interests, reporting was impacted by the sources of information available, family reaction to reporting was taken into consideration, and sources and language could be a challenge to effectively shaping content[13].

A lack of training in journalism schools on safe suicide reporting is related to poor awareness or knowledge. Most media organizations had some form of general media ethics guidelines; however, none specifically addressed how to report issues related to mental health or suicide [16]. Similarly, the topic of suicide was also not covered in the syllabus of most journalism programs [15]. Media professionals would appreciate guidance to be able to understand grief and provide support when interviewing the bereaved [17]. However, journalists noted that the primary pressure on their storytelling came from the rapidity of turnaround, which has increased over the last decade due to the networked and instantaneous nature of social media, its ubiquity, and its 24/7 content cycle[13]. Under time pressure, they often didn't have enough time to discuss with mental health professionals before they submitted suicide reports. Most suicide reports are timely breaking news. . Perhaps there was not enough time to consult health experts, or there was no regular contact with health experts who were not always available to respond to the events. As a matter of fact, those items are related to mental health literacy [20]. It is imperative to develop greater collaboration between expert bodies, journalism schools, and media organizations for the improvement of future reporting on suicide.

According to Table 5, compared to the period before the release of the Suicide Prevention Act in 2019, the number of news stories about suicide significantly decreased (n=1257 in 2018; n= 753 in 2019; n=562 in 2020, n=596). This finding is in line with our previous study [19]. The law did suppress the number of suicide-related news while comparing the trend two years before and after the enactment of the law [19]. In respecting editorial freedom, the purpose of the law is to mainly encourage more responsible reporting of suicide news rather than restricting suicide news reporting [18]. Some possible strategies include direct contact with chief editors of various media outlets, publishing articles in local media, and providing expert commentaries on different news platforms such as TV, radio, social media, and online news [2].

Establishing an instant consultation platform between media professionals and mental health professionals could improve adherence to these recommendations. Here in Taiwan, we have formed a LINE group with journalists, hoping they can consult mental health experts before releasing suicide-related news. Moreover, approaching various media outlets individually in the event of inappropriate reporting, timely responsive contact with local newsrooms on any misreporting, and even proactive actions before reporting a specific case most likely to be reported during the following hours are all suggested [19]. Based on the results, we still have a lot of room for improvement to orchestrate the platform for media professionals and health experts to work together.

Most of the previous studies focused on the appropriateness of reporting according to the WHO

guideline. Inappropriate media reporting of celebrities could increase suicide rates in the general public [21-24]. Detailed media reports and subsequent Google searches on carbon-monoxide self-poisoning also significantly increased suicides using the method [23]. However, copycat suicide might become more common nowadays with the rapid increase in connection due to growth in internet news media, personal broadcasting, online communities, and social network services, which provide a highly connected matrix whereby provocative suicide news reports can transmit and disseminate rapidly and widely.

The study demonstrated the content characteristics of Taiwan's online media suicide reports and indicated that over 95% of the reports emphasized suicide methods. Importantly, the methods of falling from height increased obviously to the number one cause of media-reported suicide over the years. Compared to the prominent feature of a steady increase in the rate of falling from height in female suicide decedents from the national data [25], the standardized mortality rate increased from 1.5/100,000 in 2016 to 2.40/100,000 in 2021), equal to the national number one cause of hanging. Some authors highly suspected the suicide coverage from the films [9] and daily suicide news reports were contributing factors. The copycat effects could also be triggered or aggravated by the accumulated online reports' contents. The female gender especially was reported to be more vulnerable to the suicide news report [26].

Park et al. (2016) performed a subgroup analysis of copycat suicide in South Korea. They found that celebrity suicides significantly impacted suicide rates among people of the same sex or age as the celebrity [26]. Hahn Yi et al. (2019) [27] conducted a study using nationwide data on vulnerable groups for copycat suicide in South Korea. They selected 10 celebrity suicides for analysis and found that females aged 20–29 were the most susceptible subgroup. As Appendix 1 showed, the sharp increase in the rate of jumping from heights was noted for the suicide female decedents aged 15 to 29, which contributed to the general increase of jumping from height in the female gender. The copycat suicide patterns included both mass and point clusters [28,29]. The mass clusters mainly exhibited a one-to-many transfer mode, while the point clusters occurred to nearby individuals. Thus, the mass clusters could be defined as an upsurge in suicide frequency caused by mass media. Although in our study, only 1.4% of the reports related to celebrities, the persistent mentions of lethal methods like falling from height and drowning could negatively impact vulnerable individuals at risk of suicide, particularly for young females.

Conclusions

More than 95% of the online media report on suicide news mentioned suicide methods, including falling from height, drowning, and charcoal burning. Although the National Suicide Prevention Act had the effect of reducing the number of media reports on suicide, falling from height was still the most commonly reported method among online media. The latent copycat effects triggered by online media reports among the individuals at risk of suicide need to be highlighted and further investigated. It is critical to collaborate more intensely between expert bodies, journalism schools, and media organizations for the improvement of future reporting on suicide.

Limitation

The current study focused only on the online reports of major media in Taiwan. It did not involve other domestic news publications or other forms of media, such as social networking. However, the four newspapers had the highest readership and good coverage of essential media channels in Taiwan, and so the results could represent the mainstream news reporting styles regarding suicide. Future studies should include more comprehensive media sources for longer-term observations.

Declaration of competing interests

The authors have no conflicts of interest relevant to this article.

Acknowledgments

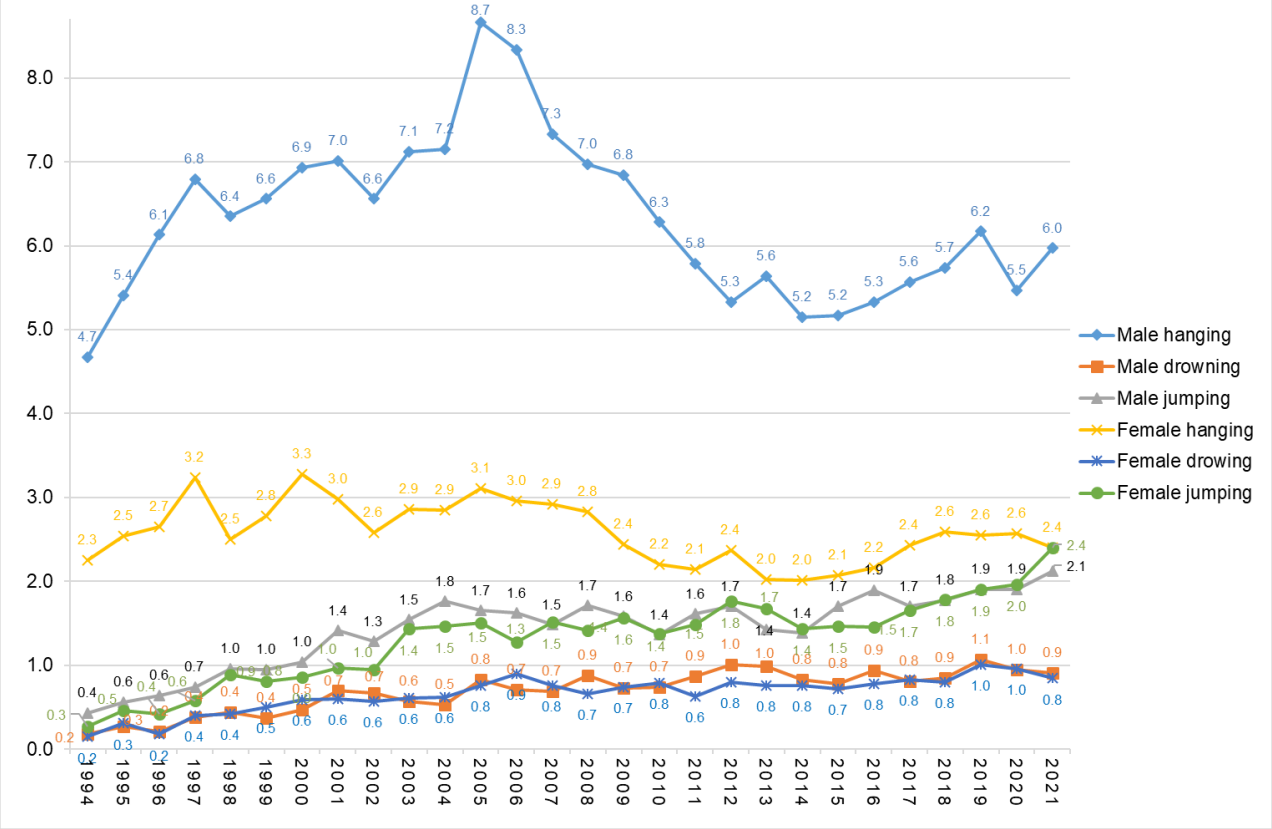
The national suicide prevention program was executed by the Taiwanese Society of Suicidology and the Taiwan Suicide Prevention Center was financially supported by the Ministry of Health and Welfare. The authors thank all our colleagues in the TSPC for their active participation in data collection and statistical analysis.

References

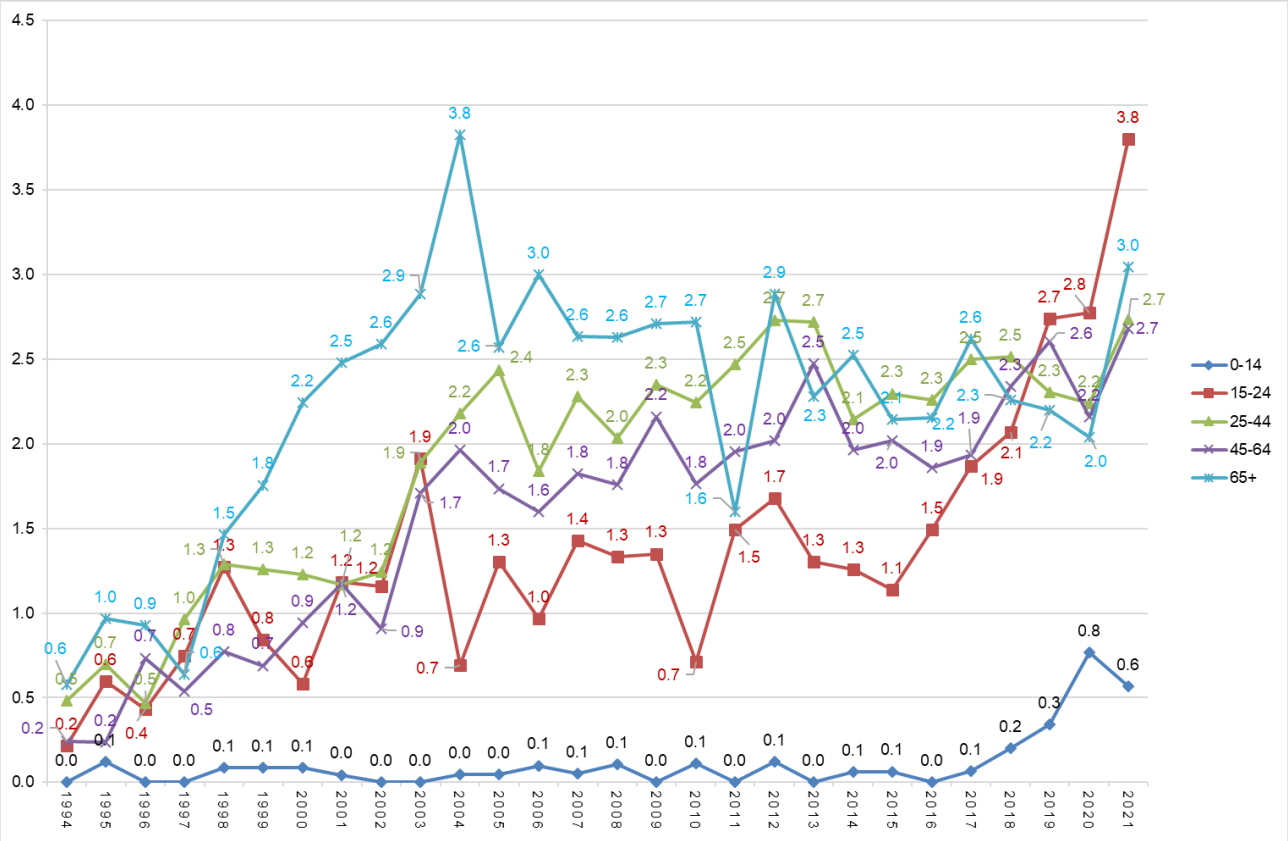
1. Niederkrotenthaler T, Voracek M, Herberth A, et al: Role of media reports in completed and prevented suicide: werther v. Papageno effects. Br J Psychiatry 2010;197(3):234-43.
2. Wu CY, Lee MB, Liao SC, et al: Adherence to World Health Organization guideline on suicide reporting by media in Taiwan: a surveillance study from 2010 to 2018. J Formos Med Assoc 2021;120(1 Pt 3):609-620.
3. World Health Organization (WHO). Preventing suicide: a resource for media professionals. 2008 http://www.who.int/mental_health/prevention/suicide/resource_media.pdf.
4. Sinyor M, Pirkis J, Picard A, et al.: Towards a shared undrstanding: perspectives from Toronto's first media forum for suicide prevention. Can J Public Health 2016; 107(3): e330-332.
5. Chen YY, Liao SF, Teng PR, et al: The impact of media reporting of the suicide of a singer on suicide rates in Taiwan. Soc Psychiatry Psychiatr Epidemiol 2012;47(2):215e22.
6. Niederkrotenthaler T, Till B, Kapusta ND, et al: Copycat effects after media reports on suicide: a population-based ecologic study. Soc SciMed 2009;69(7):1085e90.
7. Chen YY, Chen F, Yip PSF. The impact of media reporting of suicide on actual suicides in Taiwan, 2002-05. J Epidemiol Commun Health. 2010;65(10):934-40.
8. Liao SC, Lee MB, Lung FW, et al: Suicide prevention in Taiwan: a ten-year review. Taiwan J

Public Health. 2015;34(3):227-39.
9. Chan CT, Chen HJ, Tseng YH, et al: Short-term effect of a suicide-related drama on attempted and completed suicide of the youth in Taiwan. JoS 2022;17(2):198-206.
10. Picard RG. Commercialism and newspaper quality. Newsp Res J 2004;25(1):54-65.
11. Allern S: Journalistic and commercial news values. Nordicom Rev 2002;23(12):137-52.
12. Caple H, Bednarek M: Delving into the discourse: approaches to news values in journalism studies and beyond. Oxford: Reuters, 2013.
13. O'Brien A: Reporting on mental health difficulties, mental illness and suicide: journalists' accounts of the challenges. Journalism Stud 2021;22(12):3031-3047.
14. Cheng Q, Fu K-w, Caine E, et al: Why do we report suicides and how can we facilitate suicide prevention efforts? perspectives of Hong Kong media professionals. Crisis 2014;35(2):74.
15. Machlin A, Pirkis J, Spittal MJ: Which suicides are reported in the media and what makes them "newsworthy"? Crisis 2013;34(5):305-13.
16. Crane C, Hawton K, Simkin S, et al: Suicide and the media: pitfalls and prevention. Crisis 2005;26(1):42-47.
17. Skehan J, Maple M, Fisher J, et al: Suicide bereavement and the media: a qualitative study. Adv Ment Health 2013;11(3):223-237.
18. Fu K, Yip P: Changes in reporting of suicide news after the promotion of the WHO media recommendations. Suicide Life-Threatening Behav 2008;38(5):631e6.
19. Wu EL, Wu CY, Lee MB, et al: Comparison of suicide news reports in the media two years before and after the implementation of the Taiwan Suicide Prevention. Act. J Suicidology 2022;17(1):88-93.
20. Antebi L, Carmichael V, Whitley R: Assessing adherence to responsible reporting of suicide guidelines in the Canadian news media: a 1-year examination of day-to-day suicide coverage. Can J Psychiatry 2020;65(9):621-629.
21. Cheng, ATA, Hawton K, Chen TH, et al: The influence of media coverage of a celebrity suicide on subsequent suicide attempts. J Clin Psychiatry 2007;68(6):862-866.
22. Chang SS, Kwok SS, Cheng Q, et al: The association of trends in charcoal-burning suicide with google search and newspaper reporting in Taiwan: a time series analysis. Soc Psychiatry Psychiatr Epidemiol 2015;50(9):1451-1461.
23. Chen YY, Tsai CW, Biddle L, et al: Newspaper reporting and the emergence of charcoal burning suicide in Taiwan: a mixed methods approach. J Affect Disord 2016;15(193):355-361.
24. Cheng Q, Chen F, Yip PS: Media effects on suicide methods: a case study on Hong Kong 1998-2005. PLoS One 2017;12(4):e0175580.
25. Taiwan Ministry of Health and Welfare: Statistics report of Annual Suicide. 2021 https://dep.mohw.gov.tw/domhaoh/cp-4904-8883-107.html
26. Park J, Choi N, SJ Kim SJ, et al: The impact of celebrity suicide on subsequent suicide rates in the general population of Korea from 1990 to 2010. J Korean Med Sci 2016; 31:598-603.
27. Yi H, Hwang J, Hyun-Jin Bae HJ, et al: Age and sex subgroups vulnerable to copycat suicide: evaluation of nationwide data in South Korea. Sci Rep 2019;9:17253.
28. Thomas E. Joiner J: The clustering and contagion of suicide. Currt Direct Psychol Sci 1999;8:89-92 .
29. Niedzwiedz C, Haw C, Hawton K, et al: The definition and epidemiology of clusters of suicidal behavior: a systematic review. Suicide Life Threat Behav 2014:569-581.
30. Jang J, Myung W, Kim S, et al: Effect of suicide prevention law and media guidelines on copycat suicide of general population following celebrity suicides in South Korea, 2005-2017. Aust N Z J Psychiatry 2021;7:48674211025701
31. Taiwan Suicide Prevention Center: Annual report of Taiwan Suicide Prevention Center 2021. 2021 https://dep.mohw.gov.tw/domhaoh/lp-4905-107.html

Appendix : Suicide Methods by Gender



Appendix 1. Comparisons of the three commonly reported suicide methods by gender during 1994 and 2021.



Appendix 2. Standardized suicide rate by age in the females from 1994 to 2021.

Self-Harm in Older Adults in Hospital Registry Data : A Consecutive 2-Year Study

Jeng-Yi Tyan[1,2], Wen-Chien Hu[3], Chien-Ching Yeh[3] , Cheng-Chen Chang[1,4*]

Abstract: ***Background:*** Self-harm is a high-risk behavior and often escalates to suicide. Among people who deliberately harm themselves, older people are more likely than younger people to die by suicide. Given that older adults are a particularly high-risk group for suicide and self-harm is a powerful predictor of suicide in later life, understanding self-harm in older adults has potential value in generating strategies for the prevention of self-harm and suicide. In this study, the basic characteristics of the elderly and self-harm methods were compared with those of young adults in a two-year data analysis. ***Method:*** We retrospectively reviewed records from January 2009 to December 2010 through the Register System of a hospital suicide prevention center. Subjects with repeated self-harm were excluded. 580 subjects were reviewed, including basic data, suicide method, possible causes, and medical outcomes after self-harm behavior. Differences in sociodemographic characteristics and suicide methods between older and younger adults were analyzed using chi-square tests and Student's t-tests. Statistical significance was set at a level of $p< 0.05$. All data were analyzed with SPSS version 17.0. ***Results:*** Elderly adults were defined as older than 65 years. 580 subjects (elderly=96, 39 men and 57 women; young adults=484, 158 men and 326 women) were collected. In the older adults group, the mean age was 70.4 years (SD=9.5). In the group of younger adults, the mean age was 35.2 years (SD=8.9). Regarding the method of suicide, hanging, burning charcoal, hypnotic overdose, and wrist cutting were statistically used more frequently in young adults than in the elderly. Older adults preferred to swallow herbicides or pesticides over young adults ($p<0.001$). In causes of suicide, older adults engaged in more self-harm behaviors due to medical illness.***Conclusion:*** Older and young adults may choose their method of self-harm differently in terms of accessibility and causes. Strategies to prevent self-harm behaviors among young and old adults may be different.

Keywords: self-harm, older adults, method, cause of self-harm.

(Journal of Suicidology 2022; 17(4): 387-390. DOI:10.30126/JoS.202212_17(4).0009)

Introduction

Through the efforts of the Taiwan Ministry of Health and the Welfare and Taiwan Suicide Prevention Center, the crude suicide mortality rate dropped to 15.3 / 100,000 populations in 2021. However, the crude mortality rate of older adults (27.6 / 100,000 population) is still higher than that of all ethnic groups. Non-fatal self-harm is one of the strongest predictors of complete suicide [1], and the older the person who had a previous history of self-harm, the greater risk of subsequent suicide [2, 3]. Older adults (over 65 years) had reportedly higher suicidal intent than any other age group [4]. However, surprisingly, self-harm among older people has received little attention.compared to other age groups in Taiwan.

Self-harm is when someone injures or harms themselves to cope with or express extreme emotional distress and internal turmoil. In general, they do not intend to kill themselves, but the results can be fatal. Examples of self-harm include trying to poison oneself by taking too many tablets (medicines or something harmful), cutting or burning, hitting the head against objects, and punching or hitting oneself against something hard. People who self-harm do not intend to kill themselves [5]. However, self-harm is a high-risk behavior and often escalates to suicide. Among people who deliberately harm themselves, older people are more likely than younger people to die by suicide. Given that older adults are a particularly high-risk group for suicide and self-harm is a powerful predictor of suicide in later life, understanding self-harm in older adults has potential value in generating strategies for the prevention of self-harm and suicide. Self-harm in older adults has distinct characteristics that should be explored to improve treatment and care.

The risk factors for self-harm among older adults have been widely explored, including the influence of mental health conditions, physical illness, and psychosocial factors [6, 7]. Functional disability and some physical illnesses were associated with suicidal behavior in older adults [7]. In this study, the basic characteristics of the elderly and self-harm methods were compared with those of non-elderly adults in a two-year data analysis.

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Received: 2 December 2022; **Accepted:** 18 December 2022.

Methods

The study was based on data collected through the registration system of the Changhua Christian Hospital (CCH) suicide prevention center. CCH is the only medical center located in Changhua city, so patients come to CCH mainly from central Taiwan. Because Changhua County is best known as the granary of Taiwan, this agricultural county has its special culture and Bussan. Every patient who comes to the hospital via the emergency department or admission with self-harm behavior will upload a notification. The physical and mental health of the elderly in the emergency department deserves more attention. Through this system, the information of all individuals who come to the CCH after self-harm is recorded. Self-harm refers to intentional self-injury or self-poisoning, regardless of the type of motivation or the degree of suicidal intent or consequence [8]. This is the same definition used by the Taiwan Suicide Prevention System.

Data collection

We collected data from January 2009 to December 2010. Subjects with repeated self-harm were excluded and 580 subjects were reviewed, including basic data, suicide method, possible causes, and medical outcomes after self-harm behavior.

Statistical analysis

Differences in socio-demographic characteristics and suicide methods between older adults (≥65 years) and non-older adults (< 65 years)were analyzed using chi-square tests and Student's t-tests. Statistical significance was established at a level of $p< 0.05$. All data were analyzed with SPSS version 17.0.

Results

Numbers of persons

Older adults were defined as older than 65 years. 580 subjects (older adults=96, 39 men and 57 women; young adults=484, 158 men and 326 women) were collected. The age distribution and self-harm methods between men and women were listed in Table 1. In the older adults group, the mean age was 70.4 years (standard deviation, SD=9.5). In the young adult group, the mean age was 35.2 years (SD=8.9). Regarding the method of self-harm, hanging and swallowing herbicides were significantly used more by men, while hypnotic overdose and wrist cutting were significantly used more by women. Regarding causes of self-harm, men suffered mainly from alcohol use, unemployment, and chronic illness, while women faced significant sufferings with couple relationships and depression.

Table 1. Basic demographic data (N = 580) of all patients.

	Male (277, 47.8%)	Female (303, 52.2%)	p Value
Alive	260 (95.6%)	292 (98.6%)	0.03
< 65 y/0	229 (83%)	254 (83.8%)	
>=65 y/0	47 (17%)	49 (16%)	0.78
Methods			
Hanging	11 (4%)	2 (0.7%)	0.01
Car gas inhalation	2 (0.7%)	0	0.23
Herbicide swallowing	95 (34.3%)	55 (18.2%)	<0.001
Charcoal burning	40 (14.4%)	32 (10.6%)	0.16
Floor jumping	7 (2.5%)	8 (2.6%)	0.93
Hypnotics overdose	62 (22.4%)	134 (44.2%)	<0.001
Wrist cutting	12 (4.3%)	36 (11.9%)	0.001
Causes			
Couple relationship	29 (10.5%)	78 (25.7%)	<0.001
Emotional problem	24 (8.7%)	40 (13.2%)	0.08
Colleague relationship	5 (1.8%)	8 (2.6%)	0.5
Alcohol use	22 (7.9%)	3 (1%)	<0.001
Depression	18 (6.5%)	44 (14.5%)	0.002
Unemployment	32 (11.6%)	14 (4.6%)	0.002
Chronic illness	42 (15.2%)	25 (8.3%)	0.009

Methods used for self-harm between young and older adults

There is a similar survival rate after self-harm between young and older adults (p=0.35). Regarding self-harm methods (Table 2), charcoal burning, hypnotic overdose, and wrist cutting were statistically more commonly used in young adults than older adults. The ingestion of herbicide or pesticide was preferred by older adults over younger adults (p<0.001). Regarding the causes of self-harm, older adults performed more self-harm behaviors due to medical illness. In young adults, couple relationships, emotional problems and unemployment were significantly associated with self-harm.

Discussion

In our study, men and women used different methods and claims of self-harm or suicide. Men often tried hanging and swallowing herbicide as a means of self-harm, while women often considered hypnotic overdose and wrist cutting. Men had higher rates of alcohol use, unemployment, and chronic illness, while women had higher rates of relationship with the couple and depression. This may partially explain the significantly lower survival rate in men (95.5% vs. 98.6%) because hanging or herbicide swallowing used by men is more drastic than hypnotic overdose or wrist cutting used by women. This is in line with several studies [9, 10] that, compared to women, men choose more lethal methods, are more impulsive, are less likely to seek help for emotional problems, and express depression differently. Although men experienced depression in the same way as women did, they differed in terms of expression. It means that men express depression in a different way, such as through alcohol use or are less likely to be diagnosed [11].

In our study, young adults and older people differed in the methods and causes of self-harm. Young adults tended to hurt themselves with methods such as charcoal burning, hypnotic overdose, or wrist cutting. This finding is consistent with other studies that adolescents or young adults often self-poison or self-cut themselves [12]. Furthermore, charcoal burning is perceived as an easily accessible and painless method of dying among young people [13]. Therefore, future efforts to target these perceptions regarding charcoal-burning suicide may be warranted in both media reporting and suicide prevention programs.

Young adults often hurt themselves due to the claims of the couple relationship, emotional problems, and unemployment. Because the group of mean age of the young adults was 35.2 years (SD=8.9) in our study, relationship or work issue are prevalent in the age group. The relationship problem is commonly reported to be the precipitating factor for suicide in East Asia [14].

Table 2. Comparison between young and older adults.

	<65 y/o	>=65 y/o	p Value
Alive	462 (97.5%)	89 (95.7%)	0.35
Methods			
Hanging	11 (2.3%)	2 (2.1%)	0.9
Car gas inhalation	2 (0.4%)	0	0.53
Herbicide swallowing	95 (19.7%)	54 (56.3%)	<0.001
Charcoal burning	70 (14.5%)	2 (2.1%)	0.001
Floor jumping	15 (3.1%)	0	0.08
Hypnotics overdose	184 (38.1%)	12 (12.5)	<0.001
Wrist cutting	46 (9.5%)	2 (2.1%)	0.016
Causes			
Couple relationship	97 (20.1%)	10 (10.4%)	0.026
Emotional problem	64 (13.3%)	0	<0.001
Colleague relationship	12 (2.5%)	1 (1%)	0.71
Alcohol use	23 (4.8%)	2 (2.1%)	0.24
Depression	57 (11.8%)	5 (5.2%)	0.06
Unemployment	46 (9.5%)	0	0.002
Chronic illness	29 (6%)	37 (38.5%)	<0.001

Liu et al. commented that Asian women often lack the resources to deal with marital and family problems under a patriarchal culture [14]. Although time is changing and we are now in the 21st century, gender equality is less than an issue in Taiwan. This implied that we should still be cautious about different burdens in terms of gender and age.

Older adults tend to use herbicides and pesticides; this may be due to accessibility in the agricultural area (Changhua County). For the elderly, the aging process is the most relevant characteristic of physical illness and disability. Those who have physical illness seem to easily feel worthless due to their disability, which may lead to the consequence of increased suicide ideation. Elderly people who have experienced negative life events are more likely to self-harm. Among negative life events, loneliness and economic status were strongly associated with self-harm among older adults [15].

There are several limitations in this study. First, the information on suicidal behaviors was based on a retrospective self-report and therefore subjected to recall bias and the unwillingness of the respondents. Second, since the participants in this study were hospital-registered data, the findings of this study cannot be generalized to other populations. But CCH is the only medical center in Changhua County, critically ill patients are often sent to the hospital, and this could be representative in an agricultural township. Third, among patients with self-harm behaviors, a concern raised here is whether self-harm cases and suicide attempters are two distinct populations.

Conclusion

Older and young adults may choose their self-harm methods in terms of accessibility and claims. The pattern of variables related to suicidal intent varied with age. Strategies for the recognition and prevention of self-harm behaviors among young and old adults may be different. Understanding the nature of self-harm in later life is essential to provide more effective and adequate health care to this population.

References

1. Owens D, Horrocks J, House A: Fatal and non-fatal repetition of self-harm: Systematic review. Br J Psychiatry 2002; 181: 193-199.
2. Owens D, Wood C, Greenwood DC, et al: Mortality and suicide after non-fatal self-poisoning: 16-year outcome study. Br J Psychiatry 2005; 187: 470-475.
3. Hawton K, Zahl D, Weatherall R: Suicide following deliberate self-harm: long-term follow-up of patients who presented to a general hospital. Br J Psychiatry 2003; 182: 537-542.
4. Morgan C, Webb RT, Carr MJ, et al: Self-harm in a primary care cohort of older people: incidence, clinical management, and risk of suicide and other causes of death. Lancet Psychiatry 2018; 5(11): 905-912.
5. WHO: Suicide and self-harm. 2019 https://apps.who.int/iris/ handle/ 10665/333478.
6. Fassberg MM, van Orden KA, Duberstein P, et al: A systematic review of social factors and suicidal behavior in older adulthood. Int J Environ Res Public Health 2012; 9(3): 722-745.
7. Fassberg MM, Cheung G, Canetto SS, et al: A systematic review of physical illness, functional disability, and suicidal behaviour among older adults. Aging Ment Health 2016; 20(2):166-194.
8. Hawton K, Hall S, Simkin S, et al: Deliberate self-harm in adolescents: a study of characteristics and trends in Oxford, 1990-2000. J Child Psychol Psychiatry 2003; 44(8): 1191-1198.
9. Rich CL, Ricketts JE, Fowler RC, et al: Some differences between men and women who commit suicide. Am J Psychiatry 1988; 145(6): 718-722.
10. Chehil S, Kutcher SP: Suicide Risk Management: A Manual for Health Professionals. Hoboken: John Wiley & Sons, 2012.
11. Padesky CA, Hammen CL: Sex differences in depressive symptom expression and help-seeking among college students. Sex Roles 1981; 7(3): 309-320.
12. Diggins E, Kelley R, Cottrell D, et al: Age-related differences in self-harm presentations and subsequent management of adolescents and young adults at the emergency department. J Affect Disord 2017; 208: 399-405.
13. Pan YJ, Loi MX, Lan YH, et al: Perceptions towards charcoal-burning suicide and the surge of this lethal method in Taiwan. PLoS One 2022; 17(1): e0262384.
14. Liu KY, Chen EY, Cheung AS, et al: Psychiatric history modifies the gender ratio of suicide: an East and West comparison. Soc Psychiatry Psychiatr Epidemiol 2009; 44(2): 130-134.
15. Hong Z, Zhang H, Xu L, et al: Negative life events and self-harm among the elderly: result from a survey of 7070 people aged>/=60 in China. Pychiatry Res 2021; 298: 113727.

Original Articles

Understanding Suicide in Patients with Treatment-Resistant Depression from the Perspective of the Integrated Motivational-Volitional Model of Suicidal Behavior

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Abstract: ***Background:*** Patients with treatment-resistant depression (TRD) are at a higher risk of suicide. Current studies investigating both protective and risk factors were limited. This study aimed to utilize the framework of the integrated motivational–volitional model of suicidal behavior to gain a better understanding of suicidality in the population. ***Method:*** The participants were recruited through psychiatrists' referrals in two general hospitals in northern Taiwan. Structured questionnaires were administered by a research assistant for data collection of demographics as well as resilience characteristics, suicidality, and psychosocial variables. ***Results:*** Significant differences were found between groups with a variety of suicidality (i.e., past-week suicide ideation, lifetime suicide attempt/self-harm, and future suicide intention) and the corresponding groups without suicide risks on the designated risk and protective suicide variables. Noticeably, resilience, inferiority, and hopelessness were found to be the main variables that significantly affected all of the three suicidality outcomes. ***Conclusion:*** Several factors (e.g., resilience and inferiority) were identified as potential key factors in suicide prevention among TRD patients in northern Taiwan. Further studies are needed to determine the directions of the relationships and their associations with other possible factors to build a more comprehensive foundation of suicide prevention for the targeted populations.

Keywords: the Integrated Motivational-Volitional model of suicidal behavior, treatment-resistant depression, resilience, subjective social status, inferiority, hopelessness.

(Journal of Suicidology 2022; 17(4): 391-398. DOI:10.30126/JoS.202212_17(4).0014)

Introduction

Suicide is a serious public health issue both globally and in Taiwan. According to WHO, suicide, one of the leading causes of death, takes away more lives than malaria, HIV/AIDS, breast cancer, war, and homicide [1]. Moreover, 703,000 people worldwide die by suicide each year. In 2019, suicide caused more than one death in every 100 deaths (1.3%) with a global age-standardized suicide rate of nine deaths per 100,000 population. According to Taiwan's suicide statistics, a total of 3,656 victims died by suicide in 2020 with a crude suicide rate of 15.5 deaths per 100,000 population [2]. Additionally, suicide was the 11th leading cause of death in the same year. Taken together, it is both critical and urgent to identify risk and protective factors in order to prevent further tragedies from happening, especially among at-risk populations.

All psychiatric disorders, including alcohol use disorder, depression, bipolar disorder, etc., were identified as robust suicide risk factors among both men and women [3]. And depression was found to be the strongest risk factor among them putting both men and women at a greater than the 15-fold risk for suicide. Unfortunately, depression is estimated to have a chronicity rate of about 20% [4]. That is, one in five depressed patients develops chronic depression. Furthermore, it was estimated that only 6% of patients with major depressive depression (MDD) in primary care achieved remission [5]. And those patients are often classified as suffering from treatment-resistant depression (TRD) which is generally defined and recognized as failing to respond to at least two adequate antidepressant treatment trials for MDD [6]. Although TRD episodes are more commonly seen in MDD patients, patients suffering from bipolar disorder may also experience TRD episodes in their depressive phase. And the estimated incidences of attempted and completed suicide for TRD patients were 4.66 and 0.47 suicides per 100 patient-years, respectively [7]. That is 10 and 2-fold greater than the incidences reported in non-resistant patients with 0.43 attempted and 0.22 completed suicides per 100 patient-years [8]. Consistently, TRD was found to be related to higher rates of suicide and self-harm compared to non-TRD patients [9].

Collectively, there is no doubt that preventing suicide, especially in TRD patients is imperative. Therefore, the current study aimed to employ the integrated motivational–volitional model of suicidal behavior (IMV) to get a more comprehensive understanding of this high-risk population in Taiwan [10]. The model contains three parts: the pre-motivational phase, the motivational phase, and the volitional phase.

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Received: 2 December 2022; **Accepted:** 19 December 2022.

The first phase describes the biopsychosocial context that may put people at higher risk for the emergence of suicide ideation and behaviors. The second phase depicts how the feelings of defeat, humiliation, and entrapment lead to the emergence of suicide ideation/ intention and what kind of factors (i.e., the threat to self-moderators and motivational moderators) moderate the process. The final phase delineates the volitional moderators (VM) that may be responsible for the transition from ideation to behaviors. And the current study mainly investigated several different motivational variables such as subjective social status (SSS; i.e., the perception of one's relative social standing compared to others), resilience (i,e., the ability to bounce back from and adaptively cope with great stressors [11]), inferiority, social support, loneliness, and hopelessness. One volitional variable, which was family suicide history, was also examined.

We hypothesized that there would be significant differences in all of these variables between the suicide groups in the current sample (i.e., participants with one-week suicide ideation, future suicide intention, or a history of suicide attempt/ self-harm) and the corresponding groups of people without those experiences.

Methods

Design

The present cross-sectional study was part of a 3-year prospective study that examined the characteristics of a cohort of TRD patients and the effectiveness of a treatment method other than medication (i.e., Group-based cognitive behavioral therapy). The previous method has been published elsewhere [12]. In this study, we particularly investigated the relationships between suicidality and potential risk (low SSS, inferiority, family suicide history, loneliness, and hopelessness) and protective factors (resilience and social support) in TRD patients.

Procedure and participants

The participants were all recruited by psychiatrists' referrals at two general hospitals in northern Taiwan from January 2018 to October 2019. They were recruited from different clinical settings including psychiatric daycare services, outpatient departments, and inpatient units. The inclusion criteria included being 20 years of age and above, failing two antidepressant trials, recent partial remission of major depressive episodes, having normal cognitive function, stable mental state, being able to communicate in Mandarin or Taiwanese, and signing the informed consent form. And exclusion criteria included cognitive dysfunction, unstable condition, refusing to provide any personal information, and high suicide risk. The present study was approved by the research ethics committees of two general hospitals in northern Taiwan (201612198RINB and 20190106R).

Measurements

Demographics and psychosocial information

Demographics such as gender, age, educational years, educational level (middle school and below/ high school/ college and above), marital status (single/ divorced/separate/widow/married cohabited), religion (none/Buddhism/Taoism/ Catholic/ Christian), employment status (none/retired/employed/student/ housekeeper), and living status (alone/living with others) were collected. In addition, feelings of hopelessness and loneliness were assessed using yes or no questions. And the feeling of inferiority was evaluated using one of the items of the Brief Symptom Rating Scale (BSRS-5) [13]. The participants rated their levels of distress toward feelings of inferiority on a 5-point Likert scale from 0= not at all through 4= extremely.

Subjective Social Status (SSS)

SSS was evaluated using the MacArthur Scale of Subjective Social Status in which respondents are asked to place themselves on a 10-rung ladder reflecting social status in comparison to the general population in the country with the top of the ladder representing people who have the most money, education, and respected jobs and the bottom of the ladder representing people who have the least money, education, and respected jobs [14]. The scale has been further expanded to include another 10-rung ladder in which respondents rated their SSS in comparison with their self-defined community [15]. The current study used the community ladder instead of the national one since the more direct experience of comparing social status or deprivation may be more interpersonally meaningful, making community SSS a more robust predictor of psychological well-being [16]. And the community ladder had a Kappa value of 0.58 (0.56-0.61) [17].

Suicidality

Four different data regarding suicidality were collected: one-week suicide ideation, future suicide intention, lifetime suicide attempt/self-harm, and family suicide history. And those pieces of information were recorded by simply asking respondents yes or no questions.

Resilience

The Brief Resilience Coping Scale (BRCS) is a 4-item rating scale assessing one's ability to deal with or face adversity or stressful events in a highly adaptive fashion [18]. Each item is rated on a 5-point scale, from 1 being "does not describe you at all" to 5 being "it describes you very well". That is, the higher the score one gets, the more resilient he or she is. The Cronbach's alpha of the scale was 0.82 for a sample of TRD patients [19]. Furthermore, researchers have found that the scale was positively and significantly related to variables such as active problem-solving, seeking social support, positive affect, life satisfaction, proactive coping, and reflective coping [18,20].

Data analysis

Statistical analyses were performed using IBM SPSS version 25 for windows. Descriptive statistics such as mean, standard deviation, and frequencies were calculated for all variables. And independent-samples

t-tests and chi-square tests for independence were used to test the hypotheses of the study.

Results

Demographics

A total of 125 participants were recruited. Among them, 72.8% were female (n=91) and 27.2% were male (n=34) (Table 1). The average age of the sample was 55.4 years of age. The majority of the participants had an educational level of high school or above with an average of 11.9 educational years. More than half of the participants (54.4%) were either married or cohabitated. Nearly forty percent of them identified themselves as Taoists in terms of religious belief. In terms of employment status, 37.6% (n= 47) were unemployed, 28.8% (n=36) were retired, and 33.6% (n=42) were employed, students, or housekeepers. Lastly, the majority of the participants (84%) were living with others.

Descriptive statistics

The average rating of the community SSS ladder was 5.3 with a standard deviation of 2.1, and the participants were generally low in resilience with an average score of 11.7 (SD=3.8) (Table 2). The majority of them (63.2%) felt a "moderate" to "very severe" level of distress toward the feeling of inferiority. Most of the participants had feelings of hopelessness and loneliness. Regarding suicidality, approximately half of them were at high risk for suicide. Although a total of 118 participants overwhelmingly reported having suicide ideation in their lifetime, most of them did not report any suicide ideation in the previous week and future intention. Lastly, while over half of them had a history of suicide attempts or self-harm, most of them did not report any family suicide history.

The relationships between study variables and suicidality

Suicidal ideation (1 week)

Independent-samples t-tests were performed to investigate whether there were significant differences between participants with or without suicide ideation in the previous week on three measured scores (i.e., community SSS, resilience, and inferiority). The results showed that participants without suicide ideation in the previous week scored significantly higher on both community SSS and resilience ($t = 3.07$, $p < 0.01$; $t = 7.38$, $p < 0.001$) (Table 3). Moreover, they also were less stressed about the feeling of inferiority ($t = -3.83$, $p < 0.001$). In terms of the categorical variables, the results of chi-square tests for independence showed that 76.4% and 87.3% of people reporting suicide ideation in the previous week had feelings of loneliness and hopelessness ($\chi2= 5.59$, $p< 0.05$; $\chi2= 15.22$, $p < 0.001$). However, there were no significant differences between

Table 1. Demographics.

Variable	n/Mean ± SD	%
Gender		
Male	34	27.2
Female	91	72.8
Age	55.4 ± 14.6	
Educational years	11.9 ± 4.8	
Education		
Middle school and below	42	33.6
High school	25	20
College and above	58	46.4
Marital status		
Single	26	20.8
Divorced/Separate/Widow	31	24.8
Married/Cohabited	68	54.4
Religion		
None	31	24.8
Buddhism	35	28.0
Taoism	48	38.4
Catholic/Christian	11	8.8
Employment status		
None	47	37.6
Retired	36	28.8
Employed/Student/House-keeper	42	33.6
Living status		
Alone	20	16
Living with others	105	84

Table 2. Descriptive statistics.

Variables	n/Mean ± SD	%
Subjective social status (community)	5.3 ± 2.1	
BRCS Score (Resilience)	11.7 ± 3.8	
Inferiority (BSRS-5)	2.1 ± 1.5	
None	29	23.2
Mild	17	13.6
Moderate	19	15.2
Severe	30	24
Very severe	30	24
Feelings of loneliness		
Yes	80	64.0
No	45	36.0
Hopeless feelings		
Yes	85	68.0
No	40	32.0
CMHC-9	3.9 ± 2.6	
High-risk suicide (≥4)	63	50.4
Low-risk suicide (<4)	62	49.6
Future suicide intention		
No	79	63.2
Yes	46	36.8
Suicidal ideation (1 week)		
No	70	56
Yes	55	44
Lifetime suicidal ideation		
No	7	5.6
Yes	118	94.4
Lifetime suicide attempt/self-harm		
No	53	44
Yes	72	56
Family suicide history		
No	88	70.4
Yes	37	29.6

the groups regarding social support and family suicide history.

Future suicide intention

Independent-samples t-tests were used to evaluate the differences between participants with and without future intention to engage in suicide behaviors on three measured scores (i.e., community SSS, resilience, and inferiority). The findings indicated that the participants without future intention reported significantly higher levels of community SSS and resilience ($t = 3.04$, $p < 0.01$; $t = 6.03$, $p < 0.001$, respectively) (Table 4). In addition, they also reported lower levels of distress toward the feeling of inferiority ($t = -3.12$, $p < 0.01$). In terms of other categorical variables, the chi-square tests for independence showed that 59.5% of the participants without future intention had social support ($\chi2 = 4.05$, $p < 0.05$). Unsurprisingly, there were significant differences between the groups regarding the feelings of loneliness and hopelessness ($\chi2 = 7.44$, $p < 0.01$; $\chi2 = 16.51$, $p < 0.001$). Nevertheless, there were no significant differences between the two groups in terms of family suicide history.

Lifetime suicide attempt/ self-harm

Independent-samples t-test and chi-square test for independence were used to explore the relationships between lifetime suicide attempt/ self-harm and the dependent variables of the current studies. The results showed that participants with a history of suicide attempts or self-harm were less resilient ($t = 2.72$, $P < 0.01$) (Table 5). They were also more stressed about their feelings of inferiority ($t = -1.99$, $P < 0.05$), and 77.8% of them reported feeling hopeless ($\chi2 = 6.44$, $p < 0.05$). The two groups did not differ significantly on all other variables.

Discussion

The present study painted a relatively comprehensive picture of suicidality among TRD patients in Taiwan. Over half of the participants were at high risk of suicide and had a history of suicide attempts or self-harm. Moreover, over 90% of them had thought of engaging in suicidal behaviors in their lifetime. That was overwhelmingly higher than the previously reported

Table 3. Suicidal ideation (1-week) and study variables.

	Suicidal ideation (1-week)		df	t/χ2	Cohen's d/phi
	Yes	No			
	Mean ± SD/N (%)	Mean ± SD/N (%)			
SSS (community)	4.62 ± 2.02	5.76 ± 2.09	123	3.07**	0.55
Resilience	9.31 ± 2.85	13.50 ± 3.37	123	7.38***	1.34
Inferiority	2.67 ± 1.45	1.69 ± 1.41	123	-3.83***	-0.68
Social support	24 (43.6%)	41 (58.6%)	1	2.19	0.15
Family history	20 (36.4%)	17 (24.3%)	1	1.62	0.13
Loneliness	42 (76.4%)	38 (54.3%)	1	5.59*	0.23
Hopelessness	48 (87.3%)	37 (52.9%)	1	15.22***	0.37

Table 4. Future intention and study variables.

	Future intention		df	t/χ2	Cohen's d/phi
	Yes	No			
	Mean ± SD/N (%)	Mean ± SD/N (%)			
SSS (community)	4.48 ± 2.35	5.71 ± 1.86	78.02	3.04**	0.58
Resilience	9.30 ± 3.10	13.03 ± 3.45	123	6.03***	1.13
Inferiority	2.65 ± 1.48	1.81 ± 1.44	123	-3.12**	-0.58
Social support	18 (39.1%)	47 (59.5%)	1	4.05*	0.20
Family history	14 (30.4%)	23(29.1%)	1	.000	0.01
Loneliness	37 (80.4%)	43 (54.4%)	1	7.44**	0.26
Hopelessness	42 (91.3%)	43 (54.4%)	1	16.51***	0.38

Table 5. Lifetime SA/ SH and Dependent Variables.

	Lifetime SA/SH		df	t/χ2	Cohen's d/phi
	Yes	No			
	Mean ± SD/N (%)	Mean ± SD/N (%)			
SSS (community)	5.00 ± 2.28	5.60 ± 1.86	123	1.58	0.30
Resilience	10.90 ± 3.72	12.70 ± 3.62	123	2.72**	0.50
Inferiority	2.35 ± 1.51	1.81 ± 1.46	123	-1.99*	-0.36
Social support	33 (45.8%)	32 (60.4%)	1	2.04	0.14
Family history	25 (34.7%)	12 (22.6%)	1	1.6	0.13
Loneliness	48 (66.7%)	32 (60.4%)	1	0.29	0.07
Hopelessness	56 (77.8%)	29 (54.7%)	1	6.44*	0.24

prevalence rates in the general population and non-institutionalized civilians in Taiwan with lifetime rates of suicide ideation of 18.49% and 7.52% respectively [21,22]. Despite being at high risk of suicide, most of the patients in the current sample didn't report any future intention or suicide ideation within a relatively short period of the past week. Furthermore, there were significant differences between different groups on various measures in this study. For instance, compared to participants who had three specific suicidality experiences (i.e., future suicide intention, suicide ideation in the past week, and a history of suicide attempts or self-harm), participants without those experiences reported significantly higher levels of resilience. Further, they also felt less stressed about their feelings of inferiority. Unexpectedly, however, significant differences were not found between the groups in terms of family suicide history.

Community subjective social status (SSS) was found to be associated with suicide ideation in the past week and future suicide intention. And this finding can be explained by two theoretical models: social rank theory [23] and the IMV model [10]. The former model, which is based on evolutionary psychology, proposes that low mood and submissive behaviors are undesirable but adaptive responses to defeating situations such as losing rank within the social group and competing resources with dominant others. However, when the situations last and there is no possibility of escape (entrapment), the stress response turns into a chronic state known as arrested flight [24]. In other words, comparing oneself negatively with others results in the experience of being of low rank, which may make him or her feel defeated and trapped in the environment [25]. And those concepts

were further used to understand the emergence of suicide ideation in the latter model. Based on the IMV model, it was found that negative social comparisons were related to feelings of defeat and entrapment [26]. And defeat acted as a mediator in the relationship between negative social comparisons and entrapment. Suggesting that the perception of being at a lower social rank may increase one's feeling of being defeated and that may further lead to entrapment. Moreover, the link between defeat and suicide ideation was found to be mediated by entrapment. That is, feelings of entrapment may potentially explain the underlying mechanism behind the transition from feeling defeated by adversities to suicide ideation. Taking these findings together, it is not surprising that participants with suicide ideation in the past week and future suicide intention placed themselves significantly lower on the community social ladder compared to those without suicide ideation and future suicide intention. In other words, it is possible that they were trapped in the feelings of being defeated resulting from the experience of being of lower social standing than others. Similarly, the finding, which showed that the more stressful one was about the feeling of being inferior to others, the more likely he or she had suicide ideation in the past week and future suicide intention, further confirmed how negative social comparisons may affect the emergence of suicide ideation.

Resilience played a completely different role in the present study with the TRD patients without suicide ideation in the past week and future suicide intention showing significantly higher levels of resilience compared to the other group. This is consistent with the study that reported that resilience had a potential moderating effect on the relationship between depressive symptoms and suicide ideation even after controlling for covariates such as age, education year, marital status, and monthly family income [27]. In addition, among the patients with high levels of depressive symptoms, 61.1% of the patients, who had low resilience, reported moderate-severe suicide ideation. In comparison, only 38.8% of high resilience patients had the same experience. Furthermore, resilience was found to have a moderating effect on the relationship between defeat and entrapment [26]. Nevertheless, the effect was only valid when the feeling of being defeated was high. This indicated that resilience becomes a buffer only when the levels of stress are high. Moreover, resilience also buffered feelings of entrapment against suicide ideation. Yet, the possible buffering effect was no longer active when feelings of entrapment were low.

In the present study, social support may also play a protective role against suicide ideation and participants who had someone to talk to while feeling down were less likely to report future suicide intention. This was supported by the finding in a meta-analysis that there was a significant relationship between perceived social support and decreased suicide ideation among older adults [28]. On the other hand, feelings of loneliness, a potential risk factor, affected more participants with past-week suicide ideation and future suicide intention than those without those thoughts. This was an expected outcome since the link between loneliness and suicide ideation was a well-established relationship with two meta-analyses reporting that loneliness was a strong predictor of suicide ideation [28,29]. Furthermore, the possible underlying mechanism among those relationships including resilience was that perceived social support either directly weakened the relationship between loneliness and suicide ideation or indirectly affected it through resilience [30]. Interestingly, compared to non-Chinese communities, social relationships (i.e., social support and loneliness) had a stronger impact on suicide ideation among Chinese communities [28]. This suggested that there might be a cultural influence behind the relationship.

Our study also found that participants who didn't report any suicide ideation in the past week or future suicide ideation were less likely to have feelings of hopelessness in comparison to the other groups. Indeed, feelings of hope were found to have a moderating effect on the relationship between entrapment and suicide ideation [31]. In other words, entrapment was no longer associated with suicide ideation when feelings of hope were high. This suggested that people who have high hopes, namely, the ones who frequently set goals, are capable of finding pathways to attain the goals, are motivated to achieve the goals, and are at a lower risk of developing suicide ideation even when they are trapped by the adversities and challenges in life [31,32,33].

It was found that the participants, who had not engaged in any suicidal behaviors or self-harm behaviors in their lifetime, were significantly more resilient than those who had. This result was expected since deliberate self-harm was correlated positively and inversely with depression and resilience [34]. Moreover, resilience not only moderated but also mediated the link between depression and deliberate self-harm. Similarly, when comparing three high-risk groups (i.e., people who had a family history of suicide attempts and early onset mood disorders) to a healthy group, patients with prior suicide attempt(s) and a history of major depressive disorder or bipolar disorder were the least resilient among the groups [35]. In addition, resilience was also found to be strongly associated with other risk factors such as hopelessness. This is parallel to our finding that patients with a history of suicide attempts or self-harm were more likely to feel hopeless. Consistently, patients who were assessed as hopeless by a clinician were at an increased risk of further self-harm behaviors and suicide deaths within a year after the index episode [36]. Taken together, while hopelessness may put TRD patients at higher suicide risk, resilience may act as a buffer that protects them.

The results of the current study also showed that there was an association between inferiority and lifetime suicide attempts or self-harm. In parallel, the more one tended to negatively compare himself or herself with others on social media, the more he or she was at risk of suicide attempts, suicidal ideation, non-suicidal self-injury (NSSI), and NSSI ideation [37]. Interestingly, although people with a history of NSSI obviously experienced greater shame, worse self-concept integration, and more negative social comparison, the social comparison was not independently associated with NSSI; nevertheless, shame was still able to differentiate people with a history of NSSI from people without [38]. Similarly, in the current study, the more one was stressed about feelings of inferiority, the more likely he or she had a history of suicide attempts or self-harm. The above findings suggested that comparing oneself negatively to others may not be detrimental per se, but the ensuing

feelings of distress or shame may put individuals at a higher risk. This suggestion does not contradict the finding that negative social comparison may lead to the emergence of suicide ideation through feelings of defeat and entrapment [26] but indicates that there may be other potential variables that mediate or moderate those relationships, especially when thoughts turn into actions according to the IMV model [10]. Furthermore, this explanation may be true since social comparison may lead to feelings of helplessness through feelings of shame [39]. Moreover, a suicide attempt may be considered as an attempter's last resort to escape from psychological pain [40]. In other words, a suicide attempt may be seen as a sign of crying for help in a hopeless situation even if the intention behind the action may not be the determination to die, but the attempt to ask for help [41].

The finding, which showed that it was not more likely for the participants with a history of suicide attempts or self-harm to have a family history of suicide, was not consistent with the literature [42,43,44]. However, this may be explained by the limitation of the current study, namely that the sample size of the participants who had a family history (n=37) was much lower than that of those without a family history (n=88). Moreover, the current study was further limited by the following facts. It was a cross-sectional study design with a small sample size that limited the ability to examine the causal relationships between the variables. In addition, the clinical sample of the study and the relatively high age average of the sample hindered the generalizability of the results.

Conclusions

The findings showed that variables such as resilience, inferiority, and hopelessness might play important roles in the emergence of suicide ideation and the transition to action. In addition, it also showed that the IMV model might potentially help us get more insights into suicidality among TRD patients in Taiwan. Future studies should involve the examination of possible pathways that can explain the development of suicidal thoughts and behaviors. For instance, by taking culture into account, the role of perceived family perfectionism (i.e., the perception of the degree of perfectionism in the family) may play an interesting role in the formulation of suicidal thoughts by relating to feelings of defeat and entrapment [45]. Based on the IMV model, perfectionism is considered a pre-motivational variable that puts individuals at a higher risk for suicide, and family perfectionism may have a particularly strong impact on the population living in a collectivistic culture where people put much importance on family.

Declaration of conflicts of interest

The authors have no conflicts of interest.

Financial disclosure

The study was funded by the National Science and Technology Council (originally known as the Ministry of Science and Technology) under the funding number, MOST106-2314-B-002-010-MY3.

References

1. World Health Organization (WHO): Suicide worldwide in 2019: Global Health Estimates. 2021 https://www.who.int/publications/i/item/9789240026643
2. Taiwan Suicide Prevention Center: National Suicide Statistics. Taiwan Ministry of Health and Welfare. 2021 https://dep.mohw.gov.tw/domhaoh/cp-4904-8883-107.html
3. Crump C, Sundquist K, Sundquist J, Winkleby MA: Sociodemographic, psychiatric and somatic risk factors for suicide: a Swedish national cohort study. Psychol Med 2014; 44(2): 279-289.
4. van Randenborgh A, Hüffmeier J, Victor D, et al: Contrasting chronic with episodic depression: an analysis of distorted socio-emotional information processing in chronic depression. J Affect Disord 2012; 141(2-3): 177-184.
5. Pence BW, O'Donnell JK, Gaynes BN: The depression treatment cascade in primary care: a public health perspective. Curr Psychiatry Rep 2012; 14(4): 328-335.
6. Gaynes BN, Lux L, Gartlehner G, et al: Defining treatment-resistant depression. Depress Anxiety 2020; 37(2): 134-145.
7. Bergfeld IO, Mantione M, Figee M, et al: Treatment-resistant depression and suicidality. J Affect Disord 2018; 235: 362-367.
8. Braun C, Bschor T, Franklin J, Baethge C : Suicides and suicide attempts during long-term treatment with antidepressants: a meta-analysis of 29 placebo-controlled studies including 6,934 patients with major depressive disorder. PPsychother Psychosom 2016; 85(3): 171-179.
9. Gronemann FH, Jørgensen MB, Nordentoft M, et al: Treatment-resistant depression and risk of all-cause mortality and suicidality in Danish patients with major depression. J Psychiatr Res 2021; 135: 197-202.
10. O'Connor RC: Towards an integrated motivational-volitional model of suicidal behaviour. In: O'Connor RC, Platt S, Gordon J, eds. International Handbook of Suicide Prevention: Research, Policy and Practice, 1st ed. Chichester, England: Wiley-Blackwell, 2011; 181-198.
11. Dyer JG, McGuinness TM: Resilience: analysis of the concept. Arch Psychiatr Nurs 1996; 10(5): 276-282.
12. Huong PTT, Wu CY, Lee MB, Chen IM: Association of suicide risk and community integration among patients with treatment-resistant depression. Front Psychiatry 2022; 13: 806291.
13. Lee MB, Liao SC, Lee YJ, et al: Development and verification of validity and reliability of a short screening instrument to identify psychiatric morbidity. J Formos Med Assoc 2003; 102: 687-694.
14. Adler NE, Epel ES, Castellazzo G , Ickovics, JR: Relationship of subjective and objective social status with psychological and physiological functioning: preliminary data in healthy white women. Health

Psychol 2000; 19(6): 586-592.
15. Adler N, Stewart J: The MacArthur scale of subjective social status. San Francisco: MacArthur Research Network on SES & Health, 2007.
16. Cundiff JM, Smith TW, Uchino BN, Berg CA: Subjective social status: construct validity and associations with psychosocial vulnerability and self-rated health. IJBM 2013; 20(1): 148-158.
17. Giatti L, Camelo LDV, Rodrigues JFDC, Barreto SM: Reliability of the MacArthur scale of subjective social status-Brazilian longitudinal study of adult health (ELSA-Brasil). BMC Public Health 2012; 12(1): 1-7.
18. Sinclair VG, Wallston KA: The development and psychometric evaluation of the Brief Resilient Coping Scale. Assessment 2004; 11(1): 94-101.
19. Huong PTT, Wu CY, Lee MB, et al: The influence of research follow-up during COVID-19 pandemic on mental distress and resilience: a multicenter cohort study of treatment-resistant depression. IJERPH 2022; 19(6): 3738.
20. Wilks S, Guillory S, Geiger J, et al: Assessing psychological resilience among pre-surgery PLIF (posterior lumbar interbody fusion) patients in Louisiana: psychometric evaluation of the Brief Resilient Coping Scale. J La State Med Soc 2018; 170(1): 2-5.
21. Lee JI, Lee MB, Liao SC, et al: Prevalence of suicidal ideation and associated risk factors in the general population. JFMA 2010; 109(2): 138-147.
22. Shan JC, Chen IM, Lin PH, et al: Prevalence and correlates of suicidal behaviors in the Taiwan Psychiatric Morbidity Survey. JFMA 2022; 121(7): 1238-1247.
23. Price JS: Genetic and phylogenetic aspects of mood variation. Int J Ment Health 1972; 1(1-2): 124-144.
24. Dixon AK, Fisch HU, Huber C, Walser A: Ethological studies in animals and man, their use in psychiatry. Pharmacopsychiatry 1989; 22: 44-50.
25. Gilbert P, Allan, S: The role of defeat and entrapment (arrested flight) in depression: an exploration of an evolutionary view. Psychol Med 1998; 28(3): 585-598.
26. Wetherall K, Robb KA, O'Connor, RC: An examination of social comparison and suicide ideation through the lens of the integrated motivational–volitional model of suicidal behavior. Suicide Life-Threat Behav 2019;4 9(1): 167-182.
27. Min JA, Lee CU, Chae JH: Resilience moderates the risk of depression and anxiety symptoms on suicidal ideation in patients with depression and/or anxiety disorders. Compr Psychiatry 2015; 56: 103-111.
28. Chang Q, Chan CH, Yip PS: A meta-analytic review on social relationships and suicidal ideation among older adults. Soc Sci Med 2017; 191: 65-76.
29. McClelland H, Evans JJ, Nowland R, et al: Loneliness as a predictor of suicidal ideation and behaviour: a systematic review and meta-analysis of prospective studies. J Affect Disord 2020; 274: 880-896.
30. Zhang D, Wang R, Zhao X, et al: Role of resilience and social support in the relationship between loneliness and suicidal ideation among Chinese nursing home residents. Aging Ment Health 2021; 25(7): 1262-1272.
31. Tucker RP, O'Connor RC, Wingate LR: An investigation of the relationship between rumination styles, hope, and suicide ideation through the lens of the integrated motivational-volitional model of suicidal behavior. Arch Suicide Res 2016; 20(4): 553-566.
32. Snyder CR: Hope theory: rainbows in the mind. Psychol Inq 2002; 13(4): 249-275.
33. Snyder CR, Harris C, Anderson JR, et al: The will and the ways: development and validation of an individual-differences measure of hope. J Pers Soc Psychol 1991; 60(4): 570.
34. Xiao Y, He L, Chen Y, et al: Depression and deliberate self-harm among Chinese left-behind adolescents: a dual role of resilience. Asian J Psychiatr 2020; 48: 101883.
35. Hendricks R, Keilp JG, Lesanpezeshki M, et al: Deconstructing resilience in patients at high risk for suicidal behavior. J Affect Disord 2023; 323: 320-326.
36. Steeg S, Haigh M, Webb RT, et al: The exacerbating influence of hopelessness on other known risk factors for repeat self-harm and suicide. J Affect Disord 2016; 190: 522-528.
37. Kingsbury M, Reme BA, Skogen JC, et al: Differential associations between types of social media use and university students' non-suicidal self-injury and suicidal behavior. Comput Hum Behav 2021; 115: 106614.
38. Taylor PJ, McDonald J, Smith M, et al: Distinguishing people with current, past, and no history of non-suicidal self-injury: shame, social comparison, and self-concept integration. J Affect Disord 2019; 246: 182-188.
39. Lim M, Yang Y: Effects of users' envy and shame on social comparison that occurs on social network services. Comput Hum Behav 2015; 51: 300-311.
40. Silverman MM, Berman AL, Sanddal ND, et al: Rebuilding the tower of Babel: a revised nomenclature for the study of suicide and suicidal behaviors part 2: suicide-related ideations, communications, and behaviors. Suicide Life-Threat Behav 2007; 37(3): 264-277.
41. Tsirigotis K, Gruszczynski W, Lewik-Tsirigotis M: Manifestations of indirect self-destructiveness and methods of suicide attempts. Psychiatr Q 2013; 84: 197-208.
42. Brent DA, Melhem NM, Oquendo M, et al: Familial pathways to early-onset suicide attempt: a 5.6-year prospective study. JAMA Psychiatry 2015; 72(2): 160-168.
43. Dhingra K, Boduszek D, O'Connor RC: Differentiating suicide attempters from suicide ideators using the Integrated Motivational–Volitional model of suicidal behaviour. J Affect Disord 2015; 186: 211-218.
44. Branley-Bell D, O'Connor DB, Green JA, et al: Distinguishing suicide ideation from suicide attempts: further test of the Integrated Motivational-Volitional Model of suicidal behaviour. J Psychiatr Res 2019; 117: 100-107.
45. Wang KT: The Family Almost Perfect Scale: Development, psychometric properties, and comparing Asian and European Americans. Asian American Journal of Psychology 2010; 1(3), 186-199.

The Psychosocial Characteristics and Suicide Risks Among Patients with Treatment-Resistant Depression

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Abstract: ***Study Objectives:***Suicide is a complex behavior and a significant health priority. Owing to the high-risk feature of suicide among patients with TRD, suicide prevention is of paramount importance for this population. This study aims to investigate the psychosocial characteristics and suicide risks among patients with TRD. ***Methods and Materials:***A cross-sectional study with questionnaire investigation was performed in two general hospitals in northern Taiwan. Participants with TRD were recruited upon psychiatrists' referral from day-care ward, inpatients units or outpatient departments during January 2018 to October 2019. Socio-demographics, health and psychosocial characteristics, self-rated mental and physical health, personality, and mental distress were assessed. Suicide risk assessments of suicidality in different timeframe were documented, including past week, lifetime, or future intent. A high level of suicide risk was defined as when participants experienced both one-week suicidal ideation and a lifetime attempt; either or none of these two factors was defined as relatively low-risk. ***Results:***There were 125 participants enrolled in the study with a mean age of 55.4 years. The majority of participants had suicidal ideation in their lifetime (n=118, 94.4%), 57.6% (n=72) had ever attempted suicide, 36.8% (n=46) revealed their future suicide intent.The mean score of BSRS-5 was 10.8, with 80.8% (n=101) had score ≧ 6. CMHC-9 score was 4.0 with 50.4% participants were categorized in high-risk suicide group (cut off score ≥4). Age and self-rated mental health were negatively and moderately correlated with suicide risk level; self-rated physical health showed small correlation with suicide risk (r=-0.276). However, the BSRS-5 (mental distress or psychopathology) and CMHC-9 (overall suicidality) total score were positively and strong correlated with suicide risk level. Stepwise linear regression model with one-week suicidal ideation revealed the BSRS-5 total was significantly correlated with standardized coefficients of 0.486. , in which depression was the most significant predictor for one-week SI (P=0.001) among participants with TRD. ***Conclusion:***This study revealed that younger age, depression, insomnia, and unpleasant family events significantly correlate with suicide risk in TRD. Psychopathology of BSRS-5 was important predictors in one-week suicide ideation, in which depression was the most significant factor. The findings of the study provided a preliminary understanding of the psychosocial characteristics and suicide risks among TRD patients in Taiwan.

Keywords: suicide risk assessment, suicidality, treatment-resistant depression, psychopathology, mental distress.

(Journal of Suicidology 2022; 17(4): 399-407. DOI:10.30126/JoS.202212_17(4).0012)

Introduction

Suicide is a complex behavior and a significant health priority. The age-standardized suicide rate was 9.2 suicides per 100,000 persons in 2019 estimated by the World Health Organization [1]. In Taiwan, the standardized suicide rate was 11.8 per 100,000 persons in 2020 and was the 11th leading cause of mortality [2]. Suicide prevention tasks aim to increase awareness and strengthen prevention strategies in a comprehensive way [3]. For suicide mortality, mental disorders had substantially increased rates of more than ten times compared with the general population [4]. Noteworthy, depression had an increased suicide risk of 19.7 times compared with the general population [4]. Depression was found to be significantly associated with gender, family history of psychiatric disorder, previous suicide attempt, severe type of depression, hopelessness, and comorbid disorders (such as anxiety and misuse of alcohol and drugs) [5].

Identifying the severity of depression is of paramount role in suicide risk evaluation [5]. Among patients with depression, treatment-resistant patients had a higher suicide risk, i.e., 0.47 for completed and 4.66 for attempted suicides per 100 patient-years irrespective of treatment [6]. Furthermore, patients with treatment-resistant depression (TRD) have higher rates of suicide and self-harm compared with non-TRD patients; the adjusted hazard ratios were 2.20 and 1.51, respectively, in the first year of the follow-up study in Denmark [7].

Owing to the high-risk feature of suicide among patients with TRD, suicide prevention is of paramount importance for this population. Biopsychosocial determinants for suicidality in depression were discussed, such as psychosocial risk factors, coping skills, and psychiatric disorders. It is hypothesized that imminent suicidality may have unique neurobiological mechanisms

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Received: 5 December 2022; **Accepted:** 23 December 2022.

different from depression without serious suicidality [8]. In addition to the difference in neurobiological mechanisms, psychosocial risk factors of suicide risk among those with TRD were not fully understood.

Suicide is not a consequence of a specific disease process, and a life-long perspective should be kept in mind [9]. In addition to psychosocial factors, variables such as personality, treatment adherence, self-efficacy, resilience, and quality of life were the high risk for suicide. Moreover, clinicians were suggested to put emphasis on the assessment of predisposing and precipitating factors of suicide, regular follow-up of suicide risk, and the use of risk-assessment tools [10]. Furthermore, self-rated satisfaction with mental or physical health has a long-term effect on the suicide risk [11]. Considering all the factors listed above, this study aim to investigate the psychosocial characteristics and suicide risks among patients with TRD.

Methods

Design

This was a cross-sectional study with questionnaire investigation in two general hospitals in northern Taiwan. The participants received structured questionnaire interview after consent of participation. All the data were collected face-by-face and keyed in the computer for statistics. The ethical approval was acquired from two study hospitals separately, with the IDs 201612198RINB and 20190106R.

Participants

The participants of the current study were recruited from psychiatric day-care service, inpatients units or outpatient departments during January 2018 to October 2019. They were all confirmed with the diagnosis of MDD according to the 5th version of Diagnostic and Statistical Manual (DSM5) by the psychiatrists. All the participants were under medication treatment with or without psychological or other therapeutic treatments. In this study, we defined TRD as patients who failed at least two adequate antidepressant therapies [12; 13]. Clinical records of the participants were examined concurrently.

Other than the diagnosis, the Inclusion criteria of the participants were: (1) aged 18-64; (2) able to communicate with Mandarin or Taiwanese; (3) no detectable neuro-cognitive impairment during study period judged by the co-PI; (4) competent to sign the informed consent; the exclusion criteria were: (1) unable to cooperate due to psychiatric symptoms; (2) unwilling to provide most information in the questionnaire; (3) unstable condition. The participants received a structured questionnaire interview with an informed consent. All the data were collected face-by-face.

Measures

Socio-demographic information including age, gender, marriage, education, religion, employment status, and living status were recorded. Moreover, the following measures were used to assess physical and mental health, psychological distress, psychosocial characteristics, and the assessments toward suicidality.

Health and psychosocial characteristics

The study collected the participants' number of physical comorbidities, self-rated adherence [from 0 (worst) to 10 (best)], degree of physical pain [from 0(none) to 10(greatest)], frequent feelings of loneliness (yes/no), major live events in a year, unpleasant family atmosphere, and hopeless feelings (yes/no).

Self-rated physical and mental health

Self-report physical and mental health were derived from the response to the question of "Overall, how do you rate your physical/mental health". Ratings were from worst (1), poor (2), fair (3), good (4), to excellent (5). The analysis was then separated into binary of low and high. Responses of 1 or 2 were classified as low and 3 to 5 were classified as relatively high self-rated physical/mental health.

Maudsley Personality Inventory (MPI)

MPI is a 30-item self-administered scale, measures 3 personality traits-neuroticism, extraversion, and social desirability. Neuroticism and extraversion contained 13 items respectively, and four items for social desirability as a lie scale. Each item was rated according to personal experience as "yes/no". "Yes" response indicates the individual agrees to the description suitable for him. The "?" response indicates that the respondents had difficulty making a clear decision. The higher neuroticism score means the higher trends of neuroticism, which was more prone to poorer mental health. The Chinese MPI has proven to be a reliable scale in both the medical setting and community in Taiwan [14].

The Five-Item Brief Symptom Rating Scale (BSRS-5)

The BSRS-5, also named the "Mood thermometer", is a 5-item Likert scale (scores of 0 to 4) to assess psychological distress level of the respondent. The full scale contains the following five items of psychopathology: (1) having trouble falling asleep (insomnia); (2) feeling tense or keyed up (anxiety); (3) feeling easily annoyed or irritated (hostility); (4) feeling low in mood (depression); (5) feeling inferior to others (inferiority). An additional question for assessing suicidal ideation in past week was added at the end of the questionnaire. The cut point of BSRS-5 was set at 6; higher score indicates higher level of mental distress (i.e., presence of psychiatric morbidity). BSRS-5 has been utilized widely in clinical setting and in general population in Taiwan [15]. The questionnaire showed a high internal consistency with Cronbach's alpha = 0.84 in our study [16].

The 9-Item Concise Mental Health Checklist (CMHC-9)

The CMHC-9 was developed to assess an overall suicide risk for clinical patients or community residents. The nine items were divided into two core components of assessment, i.e., psychopathology/mental distress and major suicide risk factors. Each item was rated as

0 (no distress at all) or 1 (significant distress), with the timeframe spanning from past-week (5-item mental distress), lifetime (suicide attempt), and future (suicide intention), drug or alcohol abuse, no trustworthy person to talk to, to objectively assess the overall risk of suicide. The Cronbach's alpha of CMHC-9 in this study demonstrated adequate internal consistency with 0.77 [16]. The cut-off point was set at 4, with higher scores indicating higher suicide risk. The CMHC-9 is designed for suicide care engagement and rapid screening of psychological distress and potential common mental disorders such as depression or anxiety [17].

Suicidality assessment

Suicidality in the study included suicidal ideation in recent week or lifetime, lifetime suicide attempt, and future intent to die. In present study, high level of suicide risk was defined as when participants experienced both one-week suicidal ideation and a lifetime attempt; either or none of these two factors was defined as low-risk. These two factors were mentioned as important predictors in the general population [18,19]. Further, the history of suicide attempt was the strongest risk factor for suicide behavior among patients with TRD [20]. Thus, we aimed to identify key factors relating to this relatively high-risk status of suicide.

Data Analysis

All statistical analyses were performed by SPSS PC+ version 22. The significant level will be set at 0.05. Chi Square test was performed to compare the difference of psycho-social variables between high and low suicidal risk groups. Stepwise logistic regression models were used to estimate the association between the psychosocial variables and suicide risk. The association among the variables including socio demographics, health and psychosocial characteristics and suicidology was examined using Pearson's correlation correlations. For descriptive purposes, a correlation coefficient of 0.1-0.3 was deemed as small strength of association, 0.3-0.5 as moderate, and 0.5-1.0 as large. Further, stepwise linear regression was performed to estimate the association between psychosocial variables and suicidal risk (defined as high/low status) as the outcome. Statistical significance was set at $P<0.05$.

Results

The socio-demographic and clinical characteristics of the participants

As presented in Table 1, there were 125 participants enrolled in the study with a mean age of 55.4 years, and the average educational years was 11.9 years. More than half (54.4%) were married or cohabited; only 24.8% had no religious affiliation. Among the participants, 37.6% were jobless, and 60% lived with more than two cohabitants.

The mean score of MPI of Neuroticism was 13.8 (0-26) and Extroversion was 14.6 (0-26) (Table 2). Moreover, the mean number of comorbidities was 1.8 and drug adherence was 8.6 (0-10). Degree of physical pain was rated as 3.4 points on a 0-10 scale. The self-rated physical health level was mean-scored 2.6 (1-5), with 52.8% classified as high; comparably, self-rated mental health was mean-scored 2.3 (1-5), with 42.4% (n=53) classified as high. As high as sixty-four percent (n=80) of the participants affirmed feelings of loneliness. Notably, the most common major life event in a year was severe illness (n=47, 37.6%). Unpleasant family events were reported in 57 participants (45.6%) and hopeless feelings reported in 85 participants (68%).

In terms of suicide risk assessment, the majority of participants had suicidal ideation in their lifetime (n=118, 94.4%) (Table 2). Furthermore, 57.6% (n=72) had ever attempted suicide, 36.8% (n=46) revealed their future suicide intent. More specific in recent one-week suicidal ideation assessment, more than half participants reported no suicide ideation (58.4%, n=73), one-fifth reported severe (12%, n=15) to very severe (7.2%, n=9). In addition to suicide risk, most of participants (n=103, 82.4%) denied alcohol or drug abuse, about half of them (n=60, 48%) felt no trustworthy person to talk at low mood.

The mean score of BSRS-5 was 10.8, with 80.8% (n=101) had score $\geqq$ 6, meaning significant mental distress notifying engagement for improvement. Mean CMHC-9 score was 4.0 with 50.4% participants were categorized in high-risk suicide group (cut off score $\geq$4).

The association between the social demographic, health and psychosocial characteristics and suicidality

In this study, suicide risk was classified into high or low. As Table 1 showed, the high-risk individuals had the following significant characteristics in comparison with the low-risk group: younger age (mean age 46.8vs 59.0 years old), single($p=0.001$), employment status ($p=0.007$), living status ($p=0.028$).

As can be seen in Table 2, in addition to both of self-rated mental and physical health were significant in low to high suicide risk group (2.6 vs. 1.5, 2.7 vs. 2.2, respectively). In major life events in a year, significances were found in conflicts with others, financial crisis, break up with close friends, parental conflicts, legal dispute while the sample size of these factors were limited. Unpleasant family atmosphere and hopeless feeling also matter in suicide risk. In high suicide risk group, participants had unpleasant family atmosphere is doubled the number of participants who denied (25 vs. 12, 67.6% vs. 32.4%) and majority of participants (n=34, 91%) in high suicide risk group had hopeless feeling. The level of psychological distress rated by BSRS-5 were higher in high suicide risk group compared with low suicide risk group. In addition, in high suicide risk group, only one person reported low psychological distress. The scores of CMHC-9 in two risk group were also significantly different (3.1 vs. 6.2) in high suicide risk group, only 4 people reported less than four-points in the CMHC-9 score.

To construct our validity, Pearson correlation coefficients were assessed between each variables including social demographics, health and psychosocial

Table 1. The associations between the sociodemographic variables and suicide risk levels among patients with TRD (N=125).

n (%)/ Mean ± standard deviation	Total	Suicide risk		t/χ^2	p value
		Low (n=87)	High (n=38)		
Gender					
Male	34(27.2)	26(29.5)	8(21.6)	1.042	.307
Female	91(72.8)	61(70.5)	30(78.4)		
Age	55.4±14.6	59.0±12.7	46.8±15.4	4.160	<0.001
Educational years	11.9±4.8	11.7±5.0	12.3±4.2	-0.364	0.698
Marital status				16.307	0.001
Single	26(20.8)	11(12.5)	15(40.5)		
Divorced/Separate/Widow	31(24.8)	21(23.9)	10(27.0)		
Married/Cohabited	68(54.4)	55(63.2)	13(34.2)		
Religion				2.522	0.641
None	31(24.8)	19(21.6)	12(32.4)		
Buddhism	35(28.0)	26(29.5)	9(24.3)		
Taoism	48(38.4)	34(38.6)	14(37.8)		
Catholic/Christian	11(8.8)	9(10.2)	2(5.4)		
Employment status				17.709	0.007
None	47(37.6)	27(30.7)	20(54.1)		
Retired	36(28.8)	29(33.0)	7(18.9)		
Employed/Housekeeper	42(33.6)	32(36.4)	10(27.0)		
Living status				7.144	0.028
Alone	21(16.8)	10(11.4)	11(29.7)		
Living with one another	29(23.2)	19(21.6)	10(27.0)		
More than two cohabitants	75(60.0)	59(67.0)	16(43.2)		
Recent week SI				80.904	<0.001
None	73 (58.4)	73 (83.9)	0 (0)		
Mild	15 (12.0)	7 (8.0)	8 (21.1)		
Moderate	13 (10.4)	3 (3.4)	10 (26.3)		
Severe	15 (12)	2 (2.3)	13 (34.2)		
Very severe	9 (7.2)	2 (2.3)	7 (18.4)		
Lifetime SI				3.239	0.072
No	118(94.4)	81(92.0)	37(100.0)		
Yes	7(5.6)	7(8.0)	0(0.0)		
Lifetime SA				40.190	<0.001
No	53 (42.4)	53 (60.9)	0 (0)		
Yes	72 (57.6)	34 (39.1)	38 (100)		
Future intent to die				41.701	<0.001
No	79 (63.2)	71 (81.6)	8 (21.1)		
Yes	46 (36.8)	16 (18.4)	30 (78.9)		
Alcohol or drug abuse				1.394	0.238
No	103 82.4)	74 (85.1)	29 (76.3)		
Yes	22 (17.6)	13 (14.9)	9 (23.7)		
No trustworthy person to talk at low mood				3.432	0.064
No	65 (52.0)	50 (57.5)	15 (39.5)		
Yes	60 (48.0)	37 (42.5)	23 (60.5)		

Note: SI=suicidal ideation; SA=suicide attempt.

Table 2. The associations between health, psychosocial characteristics and suicide risk levels among patients with TRD (N=125).

n (%)/ Mean ± standard deviation	Total	Suicide risk		t/χ^2	p value
		Low (n=87)	High (n=38)		
Personality (MPI)					
Neuroticism (0-26)	13.8±8.4	13.7±8.5	13.9±8.4	0.043	0.966
Extroversion (0-26)	14.6±6.5	14.8±6.8	14.1±5.7	0.294	0.165
Comorbidity	1.8±1.6	1.9±1.6	1.7±1.7	0.568	0.571
Drug adherence (0-10)	8.6±1.7	8.8±1.7	8.3±1.8	1.338	0.183
Physical pain (0-10)	3.4±3.4	3.1±3.3	4.1±3.7	-1.893	0.061
Self-rated physical health (1-5)^	2.6±1.0	2.7±1.0	2.2±0.9	12.464	<0.001
Low	59(47.2)	33(37.5)	26(70.3)		
High	66(52.8)	55(62.5)	11(29.7)		
Self-rated mental health (1-5)^	2.3±1.1	2.6±1.1	1.5±0.6	30.832	<0.001
Low	72(57.6)	37(42.0)	35(94.6)		
High	53 (42.4)	51(58.0)	2(5.4)		
Feelings of loneliness				2.222	0.136
Yes	80(64.0)	53(60.2)	27(73.0)		
No	45(36.0)	35(39.8)	10(27.0)		
Major life events (in a year)					
Severe illness (self/others)	47(37.6)	29(33.0)	18(48.6)	2.279	0.131
Child-related issues	38(30.4)	29(33.0)	9(24.3)	1.164	0.281
Death of friend/relative	30(24.0)	19(21.8)	11 (28.9)	0.733	0.392
Conflict with others	25(20.0)	11(12.5)	14(37.8)	9.471	0.002
Financial crisis	25(20.0)	11(12.5)	14(37.8)	9.679	0.002
Marital problem/Separated	15(12.0)	11(12.5)	4(10.8)	0.112	0.738
Break up with close friends	14 (11.2)	5(5.7)	9 (23.7)	8.403	0.004
Parental conflicts	8(6.4)	3(3.4)	5(13.5)	4.162	0.041
Unemployment	8(6.4)	4(4.5)	4(10.8)	1.552	0.213
Legal dispute	8(6.4)	3(3.4)	5(13.5)	4.162	0.041
Valuables stolen	4(3.2)	2(2.3)	2(5.4)	0.750	0.386
Unpleasant family events				11.463	<0.001
Yes	57(45.6)	32(36.4)	25(67.6)		
No	68(54.4)	56(63.6)	12(32.4)		
Hopeless feelings				14.579	<0.001
Yes	85(68.0)	51(58.0)	34(91.9)		
No	40(32.0)	37(42.0)	3(8.1)		
Psychiatric morbidity, BSRS-5	10.8±5.4	9.3±5.2	14.5±3.8	9.661	0.002
Yes (BSRS-5 ≥6)	101(80.8)	65(73.9)	36(97.3)		
No (BSRS-5 <6)	24(19.2)	23(26.1)	1(2.7)		
CMHC-9	4.0±2.6	3.1±2.3	6.2±1.8	29.005	<0.001
High-risk suicide (≥4)	63(50.4)	30(34.1)	33(89.2)		
Low-risk suicide (<4)	62(49.6)	58(65.9)	4(10.8)		

Note: MPI=The Maudsley Personality Inventory; CMHC-9=The 9-item Concise Mental Health Checklist; BSRS-5=The 5-item Brief Symptom Rating Scale; ^the higher the scores, the better the levels of self-rated health conditions.

and suicidology and suicide risk level (Table 3). Age and self-rated mental health were negatively and moderately correlated with suicide risk level (r=-0.345 and r=-0.478, respectively). Self-rated physical health showed small correlation with suicide risk (r=-0.276). BSRS-5 total and CMHC-9 were positively and strong correlated with suicide risk level (r=0.511 and r=0.605, respectively). As in this study, suicide risk was defined as having both lifetime suicide attempt and recent one-week suicided ideation.One week suicide ideation was put into evaluation as a variant and the finding was parallel with our definition of suicide risk level.

Stepwise logistic regression model showed that depression, age, insomnia, and unpleasant family events were significant associated with suicide risk among patients with TRD in our observation. Among them, unpleasant family events had highest odds of suicide risk (OR=2.778), along with depressive symptom (OR=1.844), insomnia (OR=1.762), and younger age (OR=0.949) (Table 4).

To further investigate of our finding, the variables were put into stepwise linear regression model with one-week suicidal ideation (Table 5). CMHC-9 was excluded in Table 5 as it contained suicide attempt in its second part. Among the variables, only BSRS-5 total was significantly selected in standardized coefficients of 0.486. In order to further explore the association between individual item of BSRS-5 and one-week SI, as shown in Model 2, only depression was selected as significant predictor for one-week SI (P=0.001).

Table 3. Pearson's correlation coefficients among the suicidality and psycho-social variables.

	Age	Education	MPI-N	MPI-E	Comorbidity	Physical health	Mental health	BSRS-5	CMHC-9	Suicide risk level	One-week SI
Age	1	-.518**	-.229*	.279**	.270**	.107	.194*	-.237**	-.266**	-.345**	-.344**
Educational years	-.518**	1	.078	-.253**	-.248**	.075	.136	-.130	-.127	-.003	-.055
MPI_N_score	-.229*	.078	1	-.602**	.119	-.049	-.168	.357**	.278**	.020	.060
MPI_E_score	.279**	-.253**	-.602**	1	-.039	.131	.110	-.289**	-.229*	.003	.000
Comorbidity	.270**	-.248**	.119	-.039	1	-.211*	.055	.071	.037	-.027	-.058
Self-rated physical health	.107	.075	-.049	.131	-.211*	1	.518**	-.348**	-.316**	-.276**	-.253**
Self-rated mental health	.194*	.136	-.168	.110	.055	.518**	1	-.608**	-.626**	-.478**	-.534**
BSRS-5	-.237**	-.130	.357**	-.289**	.071	-.348**	-.608**	1	.853**	.511**	.464**
CMHC-9	-.266**	-.127	.278**	-.229*	.037	-.316**	-.626**	.853**	1	.605**	.483**
Suicide risk level	-.345**	-.003	.020	.003	-.027	-.276**	-.478**	.511**	.605**	1	.726**
One week SI	-.344**	-.055	.060	.000	-.058	-.253**	-.534**	.464**	.483**	.726**	1

Note: *p<0.05, **p<0.01

Table 4. Stepwise logistic regression model predicting suicide risk among patients with treatment-resistant depression (N=125)

Binary variables (reference)	β	S.E.	Wald	*p*-value	OR (95% CI)
Depression	0.612	0.260	5.524	0.019	1.844 (1.107-3.07)
Age	-0.053	0.017	9.711	0.002	0.949 (0.918-0.981)
Insomnia	0.566	0.215	6.940	0.008	1.762 (1.156-2.685)
Unpleasant family events	1.022	0.514	3.956	0.047	2.778 (1.015-7.603)

Note: OR: odds ratio; CI: confidence interval.

Table 5. Stepwise linear regression model predicting one-week suicide ideation among patients with treatment-resistant depression (N=125).

	Unstandardized Coefficients	Standardized Coefficients	p-value
Model 1			
MPI_N_score	-0.004 (-0.038-0.03)	-0.024	0.819
MPI_E_score	0.025 (-0.018-0.068)	0.119	0.251
Self-rated physical health	-0.302 (-0.883-0.279)	-0.085	0.305
Drug or alcohol abuse	-0.118 (-0.36-0.123)	-0.089	0.333
No person to talk	0.185 (-0.274-0.644)	0.069	0.426
Unpleasant family atmospheres (recent one year)	0.126 (-0.364-0.617)	0.047	0.611
Feelings of loneliness	-0.231 (-0.746-0.284)	-0.082	0.375
BSRS-5 total	0.122 (0.071-0.173)	0.486	0.000
Model 2			
Insomnia	0.085 (-0.092-0.262)	0.0868	0.344
Anxiety	0.081 (-0.188-0.349)	0.0762	0.552
Hostility	-0.02 (-0.273-0.233)	-0.0202	0.876
Depression	0.43 (0.181-0.679)	0.4268	0.001
Inferiority	-0.008 (-0.183-0.166)	-0.0091	0.926

Note: Model 1: R2=0.263; Model 2, R2=0.258

Discussion

In the current study, suicide risk was defined by one-week suicide ideation plus lifetime suicide attempt/self-harm. Our findings demonstrated that younger age and lower self-rated mental health correlated moderately with suicide risk. Moreover, younger age, depression, insomnia, and unpleasant family events significantly predicted suicide risk among TRD patients. In addition, the finding show that the psychological distress (BSRS-5) total score, in which depression single item statistically significant predicted one-week suicide ideation in our observation.

In previous research, psychosocial factors associated with suicide risk among the general population were investigated. Suicide rates vary on lifespan, and age matters. In the 10-year suicide rates report from WHO, the highest rates are among older people and the highest rates are usually among age over 85 years old, while in the United States, the highest rates are among 55-64 years old [1]. In Taiwan, the highest crude suicide mortality rate was among the age group over 65 years old, with 26.2 per 100,000 individuals in 2020 [2]. In this study, the average age was 55.4, and the average age of the high suicide- risk group was younger compared to the low suicide-risk group. This finding was also consistent with a lifetime suicide attempts and recent suicide ideation. It revealed the higher risk of suicide at younger ages. In a nested case-control study of Swedish, the highest suicide risk of TRD was bimodal of 18 to 29 years and 60-69 years old [20]. The result of our study that younger patients showed less suicide risk might be limited to our group of average of 55 years old. Another reason might be growing resilience through struggling with TRD over the years, which needs to be further investigated in future longitudinal research.

In our finding, self-rated mental health was found to be negatively correlation with suicide risk. The finding highlighted the more important role of perceived mental health conditions than subjective physical health perception for suicide risk among patients with TRD. In a previous study, poor self-reported mental health with psychotropic medication increased the risk of death by suicide (OR=6.13) and had about three times the risk of suicide death without psychotropic medication [21]. Moreover, a dose-dependent relationship between self-rated mental health and suicide mortality was found in middle-aged individuals in a survey in Norway [22]. This evidence supported our finding, suggesting that the degree of self-rated mental health may be a critical predictor for suicide risk among TRD patients.

Regarding suicide assessment, BSRS-5 and CMHC-9 both showed their potential to predict suicide risk. Especially, depression and insomnia items show significantly prediction of suicide risk, and depression significant predicted suicide ideation in recent one-week. In previous study also revealed that the severity of depression is important in suicide risk evaluation [5]. In Taiwan, BSRS-5 has been used widely in suicide prevention and has shown its efficiency screening tool for assessing psychiatric morbidity and suicide risk among psychiatric inpatients, general medical patients, and community residents [23]. This study indicated its availability in detecting suicide risk among TRD patients. Furthermore, the CMHC-9 was used to assess both psychological distress and suicidality. Considering the association between suicidality and CMHC-9, previous studies indicated its efficiency in detecting suicide ideation in the group of psychiatric subjects, community subjects; and medical outpatient subjects [17]. This study showed the validity of CMHC-9 in evaluating suicide risk among TRD patients.

In our study, another factor predicting suicide risk was unpleasant family events. According to a recent review, unhealthy family interactions can complicate patients' lives in coping with suicide ideation [24]. However, family members offer a crucial source of supporting information for suicide risk assessment and the interpersonal support required to reduce risk.

Additionally, greater family connectedness is a protective factor against depressed symptoms, which has formed the basis for research on family cohesion as a barrier against suicide ideation [25]. On the other hand, people look to their families for a feeling of identity, safety, and value in all cultures. Family members are more likely to consider suicide when they feel abandoned by their loved ones due to divorce or death, domestic abuse, sexual abuse, and feeling like a burden [24]. Similarly, strong family ties and support can be a form of suicide protection. To further these relationships, additional research in this area is still needed giving some valuable clues to possible preventive strategies.

Limitations

First, the study participants were recruited from two general hospitals, and the limited recruitment sources might lead to selection bias. Such bias might limit the power of generalizability. However, the participants were recruited from inpatients and outpatients of the hospitals, which could broaden the recruitment sources. Although the results did not reflect the differences in type of inpatients and outpatients' differences, possibly underestimating the effect of confounding factors. Also, the sex of this study is predominantly female. Further investigation into a different group TRD patients may be necessary for future studies. Second, the sample size was small, with participants of 125. Despite these limitations, the research team had designed a standardized form of questions, and the recruitment was through expertise examination. The result of this study had significant implications for suicidality interpretation and suicide prevention.

Conclusion

This study revealed that younger age, depression, insomnia, and unpleasant family events significantly correlated with suicide risk in TRD. In addition, the findings showed that the psychopathology of BSRS-5 was important predictors for one-week suicide ideation, in which depression was the most significant factor. The findings provided a preliminary understanding of the psychosocial characteristics and suicide risks among patients with TRD.

Acknowledgement

The authors appreciate funding support from the Ministry of Science & Technology (MOST106-2314-B-002-010-MY3). All the participants of this study who provided valuable information are acknowledged.

References

1. WHO: Global Health Observatory data repository. 2020 https://apps.who.int/gho/data/view.main.MHSUICIDEREGv?lang=en\
2. Taiwan Suicide Prevention Center: https://www.tsos.org.tw/web/home
3. WHO: Preventing suicide: a global imperative' report, 2014 https://www.who.int/publications/i/item/9789241564779
4. Chesney E, Goodwin GM, Fazel S: Risks of all-cause and suicide mortality in mental disorders: a meta-review. World Psychiatry 2014; 13: 153-160.
5. Hawton K, Casañas I Comabella C, Haw C, et al: Risk factors for suicide in individuals with depression: a systematic review. J Affect Disord 2013; 147(1-3): 17-28.
6. Bergfeld IO, Mantione M, Figee M, et al: Treatment-resistant depression and suicidality. J Affect Disord 2018; 235: 362-367.
7. Gronemann FH, Jørgensen MB, Nordentoft M, et al: Treatment-resistant depression and risk of all-cause mortality and suicidality in Danish patients with major depression. J Psychiatr Res 2021; 135: 197-202.
8. Li CT, Lee MB: Evident based somatic treatments and brain abnormalities for suicidality in patients with Depression. J Suicidology 2022; 17(1): 3-13.
9. Gunnell D, Lewis G: Studying suicide from the life course perspective: implications for prevention. Br J Psychiatry 2005; 187: 206-208.
10. Fazel S, Runeson B: Suicide. N Engl J Med 2020; 382: 266-274.
11. Koivumaa-Honkanen H, Honkanen R, Viinamäki H, et al: Life satisfaction and suicide: a 20-year follow-up study. Am J Psychiatry 2001; 158(3): 433-439.
12. Murphy, JA, Sarris J, Byrne GJ: A review of the conceptualisation and risk factors associated with treatment-resistant depression. Depress Res Treat 2017; 4176825.
13. Conway CR, George MS, Sackeim HA: Toward an evidence-based, operational definition of treatment-resistant depression: when enough is enough. JAMA Psychiatry 2017; 74(1): 9-10.
14. Liao SC, Lee MB, Lee YJ, et al: Association of psychological distress with psychological factors in rescue workers within two months after a major earthquake. J Formos Med Assoc 2002; 101(3): 169-176.
15. Lee MB, Liao SC, LeeYJ , et al: Development and verification of validity and reliability of a short screening instrument to identify psychiatric morbidity. J Formo Med Assoc 2003; 102(10): 687-694.
16. Huong PTT, Wu CY, Lee MB, et al: Associations of suicide risk and community integration among patients with treatment-resistant depression. Front Psychiatry 2022; 13: 806291.
17. Wu CY, Lee MB, Lin YY, et al: Development and validation of the 9-item Concise Mental Health Checklist (CMHC-9) for suicide risk assessment. J Formos Med Assoc 2019; 118(9): 1308-1316.
18. Irigoyen M, Porras-Segovia A, Galván L, et al: Predictors of re-attempt in a cohort of suicide attempters: a survival analysis. J Affect Disord 2019; 247: 20-28.
19. Hubers AAM, Moaddine S, Peersmann SHM, et al: Suicidal ideation and subsequent completed suicide in both psychiatric and non-psychiatric populations: a meta-analysis. Epidemiol Psychiatr Sci 2018; 27(2): 186-198.
20. Reutfors J, Andersson TM, Tanskanen A, et al: Risk factors for suicide and suicide attempts among Patients with treatment-resistant depression: nested case-control study. Arch Suicide Res 2021; 25(3): 424-438.

21. Onyeka IN, O'Reilly D, Maguire A: The association between self-reported mental health, medication record and suicide risk: a population wide study. SSM Popul Health 2021; 13: 100749.
22. Bramness JG, Walby FA, Hjellvik V, et al: Self-reported mental health and its gender differences as a predictor of suicide in the middle-aged. Am J Epidemiol 2010; 172(2): 160-166.
23. Lung FW, Lee MB: The five-item Brief-Symptom Rating Scale as a suicide ideation screening instrument for psychiatric inpatients and community residents. BMC Psychiatry 2008; 8: 53.
24. Edwards, TM, Patterson, JE, Griffith, JL. Suicide prevention: the role of families and carers. Asia Pac Psychiatry. 2021; 13: e12453.
25. Alvarez-Subiela X, Castellano-Tejedor C, Villar-Cabeza F, et al: Family factors related to suicidal behavior in adolescents. Int J Environ Res Public Health 2022; 19(16): 9892.

Recent Repeated Suicide Attempts in Geriatrics: A Case Series Study

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Abstract: ***Background:*** Suicide is a major public health problem. Elderly people have a higher risk of death by suicide than other age groups. Studies focusing on the elders who had suicide attempt recently are needed.***Methods:*** This is a case series study using data from a university hospital from 2011 to 2021. Five cases of repeated suicide attempts over the age of 65 years within 90 days were reported and investigated. ***Results:*** Three patients were female, and two of them had previous psychiatric history of depression. The other two patients were male and older than the female patients. The case series demonstrated that all five patients used different methods in the first and the repeated suicide attempt. Only two patients received acute psychiatric hospitalization after a suicide attempt, one of whom was admitted after the first-time suicide attempt, and the other who received psychiatric hospitalization care after the repeated suicide attempt. All these individuals eventually survived their repeated suicide attempts. Two of the patients performed dangerous cuts and underwent surgical intervention.***Conclusions:*** Geriatric suicidality is an important issue to be aware of. Our study demonstrated the demographic and clinical features of the elders who conducted repeated suicide attempts within 3 months. The findings provide implications for efforts to prevent elderly suicide.

Keywords: suicide, repeated suicide, geriatric suicide, suicide in the elderly.

(Journal of Suicidology 2022; 17(4): 408-412. DOI:10.30126/JoS.202212_17(4).0002)

Introduction

As the world population ages, the suicide rates in geriatrics remain high [1]. Elderly people have a higher risk of death by suicide than other age groups [2-4], and the phenomenon is more salient in elderly minority groups [5]. Suicidal death in the elderly is presumably to have increased over the past few years, and to have a higher risk ratio than the young. The mortality risk of suicide is increased with repeated suicide attempts [6]. Those with multiple suicide attempts had a higher risk of repeated attempts and dying in the end compared with those with single suicide attempts [7].

This study investigated the demographics and clinical profiles of individuals aged over 65 years old who were repeatedly admitted to the emergency room at Kaohsiung Medical University Hospital after suicide attempts. We presented five cases of re-attempted suicide within 90 days and evaluated variables related to the repeated suicide attempt.

Methods

This retrospective study reviewd all suicide attempters aged over 65 years who were sent to the Emergecy Room at Kaohsiung Medical University Hospital during 2011 to 2021 and reported to the National Suicide Surveillance System. Among them, those with repeated suicide attempts within 90 days were then selected. As a result, a total of 16 patients aged over 65 years old repeatedly visited the emergency room due to a suicide attempt during the ten-year period. Of these, five patients that met the full inclusion criteria for re-attempted suicide attempts within 90 days. The demographics and clinical profiles of five patients were reviewed via medical records.

Case Report

Mrs. A was 66-year-old and had a primary school education. She was divorced, jobless, and living alone. Her medical conditions included hypertension and herniated intervertebral disc of cervical spine. She had been admitted to a psychiatric hospital due to self-harm behaviors but did not have a regular outpatient follow-up. Before the index suicide attempt, she frequently visited the emergency room with multiple medically unexplained somatic complaints, such as headache, urinary frequency, and back pain. The persistent somatic discomfort led to depressed mood and guilty feelings, and conflict with her family. She cut her wrist and both

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Received: 3 November 2022; Accepted: 5 December 2022.

arms and was brought to the emergency room. The cut wound needed repair surgery. Followed by a one-month psychiatric hospitalization, she attempted to end her life again by taking excessive antihypertensive drugs with a glass of wine the day after discharge. She appeared very depressed and expressed extreme guilt toward her children, but on the other hand, she grumbled about her children's neglect. Afterwards, the patient went to a psychiatric outpatient clinic for a period, and several self-harm behaviors were still reported when close relationships had been broken up.

Mrs. B was 68-year-old and did not receive a formal education. She was widowed and lived with her son's family. She had been suffering from multiple physical conditions, including low back pain caused by lumbar spine compression fractures and chronic abdominal pain related to adhesive ileus caused by recurrent cholecystitis. The first suicide attempt occurred at the age of 50, and she began to intermittently see a psychiatrist ever since. Other medical history includes thyroid cancer post right lobectomy at the age of 40. No alcohol or other substance use disorder was reported. Her index suicide attempt was caused by taking excessive sleeping pills one night. The family then brought her to the emergency department. She reported being unable to stand the chronic pain. She left the emergency room after complete management and returned to the outpatient clinic for treatment. Twenty days after the index suicide attempt, she went to the emergency department for pain relief which made her even more depressed. About two months after the index suicide attempt, she wanted to end her life again by taking excessive hypnotics. She was referred back to the outpatient clinic after completing primary management.

Mrs. C was a 71-year-old woman with an education in junior high school. She was widowed and living with her son's family. No mental illness was noted, nor any previous suicide attempts. She never had alcohol consumption or other substance misuse previously. She had been suffering from abdominal pain due to chronic adhesive ileus for 5 years, which also led to depressed mood and suicide ideation intermittently; however, she did not seek psychiatric help. Chronic ischemic heart disease was diagnosed moreover. In addition to symptomatic treatment drugs for somatic symptoms, anxiolytics and hypnotics were prescribed by her primary physician. She attempted to end her life by cutting her wrist for the first time and was brought to the emergency department by the family. Although admission was advised, she denied further suicide ideas and left the emergency room against medical advice. However, one month later, another suicide attempt occurred; she cut her wrist more deeply and it caused a radial artery and palmaris longus tendon rupture. During the month, between two suicide attempts, she was sent to the emergency department twice due to abdominal pain. Admission was arranged owing to hypovolemic shock after the severe wrist cutting, and surgical repair of the radial artery and palmaris longus tendon was performed during this hospitalization. She still refused to be admitted to a psychiatric ward at this time.

Mr. D was a 78-year-old man with an education in junior high school. He had been retired and lived with his wife and two children. He had been diagnosed with dementia along with progressive memory decline. He had other medical conditions, such as benign prostate hypertrophy and prostate cancer post-radiotherapy. No other mental illness, including mood disturbance or formal thought problems, was reported prior to the suicide attempt. He had a romantic affair and had frequent conflicts with his family. Just two weeks later, his wife moved away. He hit his head against a wall, intending to end his life. He told a psychiatrist that he had felt depressed for over a week, and that he reused alcohol and cigarettes in an attempt to relieve his sadness. No acute intracranial hemorrhage was revealed by brain imaging. He claimed no further suicidal thoughts and refused to be admitted to a psychiatric ward for crisis intervention. However, the same day he left the emergency room, he attempted to harm himself and his daughter, using a knife in a violent confrontation between them. He was then sent by the police to the emergency room again. No actual physical damage was caused at that time.

Mr. E was a 77-year-old man who attempted suicide recurrently within 20 days. The level of education and state of his marriage were not revealed by medical records. He retired and lived with his daughter. He could deal with his life independently even though he had a stroke 25 years ago. The other physical problem he had was heart disease and post mechanical valve replacement in his 54-year-old. This man reported no previous mood disturbances, formal thought problems, substance use history, or prior self-harm behavior. Around two months before the first suicide attempt, the patient developed a significant depressive episode. No clear precipitating stressors were reported by the family, however. The family also mentioned that the patient had a prominent cognitive function decline since then. He became very regressive and could barely manage his self-care. He was once brought to the neurology outpatient department for cognitive problems where no brain lesion was disclosed through the brain computed tomography. The depression was exacerbated two weeks before the first suicidal behavior . He presented the idea of irrationally catastrophic thinking with intermittent suicide ideation with no organized plan. He cut himself with a knife and hit the wall, attempting suicide for the first time. No stressful event or dispute occurred that day. The patient denied alcohol consumption earlier that day as well. He was brought to the emergency department, where only lacerations and contusion wounds needed to be managed. Psychiatric hospitalization was suggested by the psychiatrist at the time but the patient turned it down. He was then released after a discussion with the family. He had no psychiatric visits afterwards. Nevertheless, he had another suicide attempt via drug overdose with an unknown amount of clonazepam 20 days after the first attempt. The patient had neither vital sign instabilities nor respiratory suppression as a consequence. Only hyponatremia was noted from the blood test. He was then admitted into an acute psychiatric ward and hospitalized for 42 days. He received residential treatment after discharge, and there was no suicidal behavior revealed again in the medical records.

Table 1 summarizes the demographic data,

including sex, age, education and civil status, as well as the clinical scenario of suicide attempts in each of the five cases. The female:male ratio was 3:2, the mean age was 72 (SD=5.3) years old, and only one was married. Two of them were first-time suicide attempts, while the other two elders who have a preexisting diagnosis of major depressive disorder were not the first-time suicide attmpters. The mean time interval between index suicide and repeated suicide ranged from 0 to 56 days, with a median of 28 days. Only one of the five used similar suicide attempts by wrist cutting, whereas the other four used different methods to kill themselves. Sixty percent of them attempted suicide because of their chronic medical conditions and unresolved somatic suffering. Only one had severe complications and needed surgical intervention.

Discussion

In this case series study, we demonstrated five cases of elder people who had repeated suicide attempts within three months. The demographics, precipitated life events, suicide methods, and outcomes have been described. Only two patients had pre-existing psychiatric diagnoses of major depressive disorder and previous suicide attempts. One of them had a worse outcome with severe injury and surgical repair required after repeated suicide.

Higher suicide rates were found in women in contrast to the suicide rates in men [8]. In the present study, our results also showed the elders with repeated suicide within three months seemed to disclose the predominantly female tendencies. However, our study was limited by small sample size and further investigation is needed. Common late-life issues including impaired functioning, loss of a loved one, perceived burdensomeness, worthlessness, and hopelessness may contribute to geriatric depression, suicide mortality, and morbidity [9]. Being divorced increased the risk of suicide [10], and living alone also precipitated depressive symptoms as stated by a previous study [11]. The female patient reported above had another repeated suicide attempt in the following year. Compared to the female patients, the elderly men who had attempted suicide appeared to be older and used more aggressive methods [12]. In the present study, the male patients were older than all the other women. The female patients tended to attempt suicide by drug intoxication and wrist cutting. The male patients are more inclined to use more violent methods for suicide attempts, such as cutting and bumping into the wall in our reports [13]. Nevertheless, the male population tended to be less likely to seek medical intervention as a result of male stereotypes and stigma [14], propably reflecting that the two males in our study had no previous psychiatric diagnosis. Both male repeated suicide attempters in our study were observed to have neurocognitive impairment before suicide attempts. Previous research showed that functional and cognitive decline seemed to increase the risks of suicidality in the elderly [15]. Considering prior research, suicide risks heightened when the role changed, for example in retirement and loss of respect in the community or family, were related to the crisis of hegemonic masculinity in traditional culture [16]. However, we had limited and restricted information regarding the male patients in our study, such as their previous occupation, education level, socioeconomic and marital status, and intrafamilial relationships.

Understandings the precipitants of suicide attempts

Table 1. Summars of demographics and clinical data of the live cases.

	Sex	Age	Civil status	Previous suicide attempt before index suicide	Previous psychiatric diagnosis	Day interval between repeated and index suicide	Methods of index suicide attempt	Methods of repeated suicide attempt	Precipitants of repeated suicide attempt	Outcomes of repeated suicide attempt
A	Female	66 years old	Divorced	Yes	Major depressive disorder	37 days	Wrist cutting	Drug intoxication with alcohol use	Chronic medical diseases and persistent somatic symptoms	Stable condition
B	Female	68 years old	Widowed	Yes	Major depressive disorder	56 days	Drug intoxication	Wrist cutting	Chronic medical diseases and persistent somatic symptoms	Stable condition
C	Female	71 years old	Widowed	No	Nil	28 days	Wrist cutting	Wrist cutting	Chronic medical diseases and persistent somatic symptoms	Severe injury and need surgical intervention
D	Male	78 years old	Married	No available	Nil	0 day	Bumping into the wall	Wrist cutting	Interpersonal conflicts	Stable condition
E	Male	77 years old	Unknown	No	Nil	20 days	Wrist cutting and hitting the wall	Drug intoxication	Irrational catastrophic thinking	Stable condition and psychiatric hospitalization

is crucial for suicide prevention. In the present study, we found that all three female patients experienced continuous somatic discomfort with limited medical intervention. The three female cases made suicide attempts repeatedly, even within a month, and they all re-visited the emergency department due to somatic symptoms during this period between the index and repeated suicide attempts. According to medical records, the female patients suffered distressing physical illness and feelings of burdensomeness. We furthermore found that the three female patients were widowed or divorced, and two of them had preexisting major depressive disorder prior to their suicide attempt. The first female patient in our study was reported to have repeated suicide attempt immediately after being discharged from the hospital. Previous research found several factors increasing vulnerability to suicide among elders, including depression, chronic disease, disability and social disconnection [17]. The presence of somatic symptoms seemed to be especially related to the severity of geriatric depression and suicidality [18]. Clinicians and public health departments should pay particular attention to patients during the first few days of hospitalization or the first few weeks after discharge, which is the most critical period to assess repeated suicide risks [19].

Some limitations should be addressed in the retrospective chart review of the case series study. First, the cases were only assembled from the medical records of one medical center, which probably led to selection bias. Those who attemped suicide but were sent to another hospital were unable to include in this study. Further investigation of individuals with repeated suicide across multiple medical settings is necessary for better application in generally clinical practice. Second, as this study required chart information, those who died in a repeated suicide attempt were unavailable and not included in this study. We could not access all clinical information of elders with repeated suicide. The individuals who completed suicide acquired relatively high suicide risk, and advanced research is essential to evaluate the lethal characteristics for suicidality. Finally, although the study period was 10 years, the number of cases that met our criteria was only five and very limited. A larger sample size would provide more convincing evidence.

In conclusion, late-life suicide needs to be taken into account with the aging of the population. In this case series study of repeated suicide within 3 months in the elderly, we found more female features, less than half had previous psychiatric diagnoses, and different suicide methods at repeated attempts. These findings provided information for clinicians to actively manage eldery individuals who are vulnerable to suicide.

Role of funding source

This work was supported in part by grants KMUH107-7R71 from Kaohsiung Medical University Hospital and grants MOST 109-2314-B-037-082 from the Ministry of Science and Technology, Taiwan.

Conflicts of interest declaration

No conflict of interest is declared.

Description of authors' roles

Cheng-Sheng Chen, Yi-Chun Yeh and Jia-In Lee designed the study. Hsu, Fang, Lu made contributions to acquisition of data. Yi-Chun Yeh and Cheng-Sheng Chen analyzed and interpreted the data. Hsu, Jia-In Lee, Yi-Chun Yeh, and Cheng-Sheng Chen were major contributors in writing the manuscript. All authors read and approved the final manuscript.

References

1. De Leo D, Giannotti AV: Suicide in late life: a viewpoint. Prev Med 2021; 152(Pt 1):106735.
2. Mello-Santos C, Bertolote JM, Wang YP: Epidemiology of suicide in Brazil (1980-2000): characterization of age and gender rates of suicide. Rev Bras Psiquiatr 2005; 27(2):131-134.
3. Yip PS, Tan RC: Suicides in Hong-Kong and Singapore: a tale of two cities. Int J Soc Psychiatry 1998; 44(4):267-279.
4. Yip PS: An epidemiological profile of suicides in Beijing, China. Suicide Life Threat Behav 2001; 31(1):62-70.
5. McIntosh JL, Santos JF: Suicide among minority elderly: a preliminary investigation. Suicide Life Threat Behav 1981; 11(3):151-166.
6. Chung CH, Chien WC, Yeh HW, et al: Psychiatric consultations as a modifiable factor for repeated suicide attempt-related hospitalizations: a nationwide, population-based study. J Affect Disord 2021; 278:157-164.
7. Papadopoulou A, Efstathiou V, Christodoulou C, et al: Psychiatric diagnosis, gender, aggression, and mode of attempt in patients with single versus repeated suicide attempts. Psychiatry Res 2020; 284:112747.
8. Hawton K: Sex and suicide: gender differences in suicidal behaviour. BJPsych 2000; 177(6):484-485.
9. Van Orden KA, Bamonti PM, King DA, et al: Does perceived burdensomeness erode meaning in life among older adults? Aging Ment Health 2012; 16(7):855-860.
10. Kposowa AJ: Marital status and suicide in the national longitudinal mortality study. JECH 2000; 54(4):254-261.
11. Obuobi-Donkor G, Nkire N, Agyapong VI: Prevalence of major depressive disorder and correlates of thoughts of death, suicidal behaviour, and death by suicide in the geriatric population—a general review of literature. Behav Sci 2021; 11(11):142.
12. Nordentoft M, Branner J: Gender differences in suicidal intent and choice of method among suicide attempters. Crisis 2008; 29(4):209-212.
13. Sekhon S, Patel J, Sapra A: Late onset depression. 2022 https://www.ncbi.nlm.nih.gov/books/NBK551507/
14. Hedna K, Hensing G, Skoog I, et al: Sociodemographic and gender determinants of late-life suicide in users and non-users of antidepressants. Eur J Public Health 2020; 30(5):958-964.
15. Lund-Heimark H, Kjelby E, Mehlum L, et al: Elderly patients with no previous psychiatric history:

suicidality and other factors relating to psychiatric acute admissions. BJPsych Open 2020; 6(4):7.
16. Meneghel SN, Gutierrez DM, Silva RM, et al: Suicide in the elderly from a gender perspective. Cien Saude Colet 2012; 17(8):1983-1992.
17. Ding OJ, Kennedy GJ: Understanding vulnerability to late-life suicide. Curr Psychiatry Rep 2021; 23(9):9.
18. Jeong HG, Han C, Park MH, et al: Influence of the number and severity of somatic symptoms on the severity of depression and suicidality in community-dwelling elders. Asia-Pac Psychiatry 2014; 6(3):274-283.
19. Wasserman D, Carli V, Iosue M, et al: Suicide prevention in psychiatric patients. Asia Pac Psychiatry 2021; 13(3):e12450.

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