INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 14, Issue 10, (2024) E-ISSN: 2222-6990

# Depression and Suicidal Ideation among Undergraduate Medical Students in Selangor, Malaysia

Chong Rong Cheng[1], Rojanah Kahar[1] & Syarifah Maisarah Syed Alwi[2]

[1]Department of Human Development and Family Studies, Faculty of Human Ecology, University Putra Malaysia, 43400 UPM, Selangor, MALAYSIA, [2]Department of Educational Psychology and Counselling, Faculty of Education, University Malaya, 50603 UM, Kuala Lumpur, MALAYSIA

Corresponding Author Email: rojanah@upm.edu.my

**To Link this Article:** http://dx.doi.org/10.6007/IJARBSS/v14-i10/23328 DOI:10.6007/IJARBSS/v14-i10/23328

***Published Date:*** 22October 2024

**Abstract**

Suicidal ideation is prevalent among medical students which can significantly hamper their life span development and overall quality of life. A host of psychological illnesses such as depression have been identified to contribute to this high prevalence. This study aimed to investigate the relationship between depression and suicidal ideation among medical students in Selangor, Malaysia. A total of 217 medical students participated in this cross-sectional study. The instruments used to measure depression and suicidal ideation were the Patient Health Questionnaire-9 (PHQ-9) and the Beck Scale of Suicidal Ideation (BSS), respectively. Data were analysed using independent sample t-tests and Pearson's correlation. 59.9% of our medical students demonstrated moderate to severe levels of depression. About two-thirds (66.8%) of the participants demonstrated moderate to high levels of suicidal ideation. Depression was strongly correlated with suicidal ideation. There was a significant gender difference in depression but no significant gender differences in suicidal ideation. This study provided insights and knowledge on the importance of mental health literacy, early detection, and tailored intervention of depression and suicidal ideation among medical students.

**Keywords:** Depression, Suicidal ideation, Undergraduate medical students, Life-span development, Quality of life

## Introduction

Suicide is the most prevalent health problem with a global suicide mortality rate amounting to 1.4% of all deaths worldwide (WHO, 2022; Bradvik, 2018;). It is the second and third contributing factor of mortality among females and males, respectively. According to the World Health Organisation (2019), approximately 703,000 people die due to suicide each year. This statistic corresponds to the suicide rate of around 11.5 per 100,000 people which

is equivalent to someone dying due to suicide every 40 seconds (Lee et al., 2017). In Malaysia, the suicide rate among Indians is the highest at 3.67 per 100,000 Indian population, followed by the Chinese at 2.44 per 100,000 Chinese population (NSRM, Ministry of Health Malaysia, 2011).

Psychological illnesses such as depression, substance use disorders, psychosis, personality disorders, eating disorders, and trauma-related disorders elevate the risk of suicide (Zatt et.al., 2023; Bachmann, 2018). The stress-diathesis model suggested that the risk for suicidal acts is multi-factorial whereby it can be determined by both a psychiatric illness and a diathesis such as more suicidal ideation and actions taken on suicidal feelings (Mann et. al., 1999). Suicidal ideation is described as thinking about, considering, or planning suicide (Klonsky et al., 2016). Potter and colleagues (2004), proposed a model of suicide as being part and partial of a continuum that begins with suicidal ideation, followed by planning and preparation for suicide, threatening to commit suicide, attempting suicide, and finally, completion of suicide. Death from suicide reaches the highest absolute numbers in adolescents and young adults between 15 and 29 years of age worldwide suggesting that suicide ideation and attempts are common among university students (WHO, 2022; Bachmann, 2018; Mortier et al., 2018; Eskin et al., 2016; Yang et. al. 2015). Suicidal ideation may present among university students due to leaving adolescence and entering the young adult age and/or the stressful events experienced in academic life which can negatively impact their life-span development and overall quality of life (Taylor et al., 2022; Ikhsan et.al., 2022; Miguel et al., 2021; Desalegn et al., 2020; Buchanan, 2012; Wilcox et al., 2010). These findings have also been replicated in other reviews (Ikeoluwapo et.al., 2023; Kaggwa et al., 2022; Watson et al., 2020).

A growing body of systematic reviews and studies has acknowledged medical doctors are one of the high-risk groups for suicide and this problem starts in medical schools (Dwivedi et.al., 2021; Desalegn et al., 2020; Islam et.al., 2020; Coentre et al., 2018). Globally, the prevalence of suicidal ideation among medical students ranged from 4.7% to 17.9%. (Torres et al., 2018; Adhikari et al., 2017; Sun et al., 2017; Matheson et al., 2016; Sobowale et al., 2014). A recent systematic review and meta-analysis of 195 studies in the Journal of the American Medical Association (JAMA) involving 129123 medical students in 47 countries worldwide found that 11% of the medical students reported having suicidal ideation during their medical school (Chomon, 2022; Aning et.al., 2021; Rotenstein et al., 2016).

In general, the medical program is designed in a way more intensive and requires a longer period to complete compared to many other courses (Gan & Hue, 2019). A host of factors have been identified associated with suicidal ideation such as depression, sleep disorders, higher academic load, intensive working hours, work-life conflict, lack of entertainment activities, isolation from home, and financial issues which in turn may have detrimental effects on student's socioemotional development and quality of life (Miguel et al., 2021; Barbara et.al., 2021; Desalegn et al., 2020; Atienza- Carbonel et.al., 2020; Gan et al., 2019; Wege et al., 2016). Approximately 28% to 50% of depressed medical students reported having suicidal ideation compared to 4.3% of non-depressed medical students (Adhikari et al., 2017; Sobowale et al., 2014). In Malaysia, depression acts as the second strongest predictor for suicidality whereby depressed medical students had a 5.9 times higher suicidality risk compared to non-depressed medical students (Tan et al., 2015). Based on the available

evidence, Malaysian medical students are prone to depression because of stressful exam-oriented environments prevalent among them who perceive academic excellence as the benchmark of a sound and safe doctor (Sin & Chee, 2023; Seo et.al., 2021; Francis et al., 2019). Although suicidal behavior has a high prevalence among medical students, the influence of specific factors on suicidal ideation among Malaysian medical students is still unclear. Therefore, the present study aimed to investigate the relationship between depression and suicidal ideation among medical students at one of the public universities in Selangor, Malaysia.

**Literature Reviews**

Studies of suicidal ideation were well documented, it was also well acknowledged that its factors and predictors such as stress, history of lifetime suicide attempt, depression, hopelessness, study and examinations, and financial issues on medical students have been explored in several studies (Varshney et.al, 2024; Tugnoli et.al, 2022; Watson et.al, 2020). In Pakistan, Ghazanfar et al. (2016) analyzed 1132 medical students from first to fifth year of various colleges from all provinces of Pakistan. They have recognized that the medical students were prone to have a greater risk of suicidal ideation especially those who pursued their studies in medical college regardless free will, whose parents were incapable of affording medical education, who suffered from past or family history of depression and anxiety or have a health issue or poor relationship with their family members. This study is supported by a study in India (Watson et.al., 2020) and Bangladesh (Chomon, 2022).

In the Malaysian context, a similar study was performed at University Putra Malaysia on 537 medical students from Year 1 to Year 5 by Tan, Sidik, Rampal and Ibrahim (2015). They have revealed that the five most significant predictors of suicidality were namely the history of lifetime suicide attempts, depression, discontinuing a steady love relationship, hopelessness, and loss of something precious. The history of lifetime suicide attempts was the strongest predictor for suicidality whereby the medical students who have a history of lifetime suicide attempts were 10.4 times vulnerable to suicidality. There were similarities between Ghazanfar et al (2016); and Tan et al. (2015) whereby both studies have expressed that a history of lifetime either depression or suicidality will be the factor or predictor that greatly contributed to suicidal ideation. Nonetheless, a recent study by Sin & Chee (2023) revealed that the most important reason for suicidal thoughts among university students is previous suicide attempts. It is followed by mental disorders, negative life events, financial problems, family factors and stress among others. In contrast, gender and residential area are the least important factors.

Furthermore, stress and its correlated effects experienced by medical students were highly linked to suicidal ideation. A study conducted in Poland on 100 medical students from first to final year by Rosiek, Rosiek-Kryszewska, Leksowski and Leksowski (2016) has indicated that chronic stress was associated with suicidal thinking, depressive symptoms, and anxiety in medical students. They have identified that 66% of medical students tend to have suicidal thoughts under stress. This was also supported by Ghazanfar et al. (2016) hat have described those effects of stress such as irritability, inability to sleep, fatigue, depression, reduce appetite, desire to harm oneself, feeling of unworthiness and thoughts of leaving medical education were discovered to be significantly linked to suicidal thoughts. In addition, Matheson et al. (2016) have also claimed that the most common sources of stress in

undergraduate medicals students were study and examinations, financial issues and relationships. Taken together, these findings have provided important insights into how stress and its correlated effects were associated with suicidal ideation.

Apart from that, Sun et al. (2017) have shown that mother's education level, mother's vocation, mother's parenting style, parental relationship and psychological condition were correlated with a higher level of lifetime suicidal ideation in China. However, they did not find the associations of father's education level and father's vocation with suicidal ideation. This can be explained by the Chinese traditional culture whereby mothers mainly looked after the babies. Therefore, the respondents in the study spent more time with their mothers than fathers and so mothers may act more pivotal roles in their ideation compared to fathers.

**Prevalence of Suicidal Ideation**

There was also a large volume of published studies describing the prevalence of suicidal ideation involving medical students in countries of different continents worldwide including North America (Canada), South America (Brazil), Africa (Egypt), Europe (Poland) and Asia (China, Pakistan, Nepal and Malaysia). In the North America context, a study by Matheson et al. (2016) at Dalhousie University Canada involved 381 medical students including 232 undergraduates (year 1 to year 4) and 149 postgraduates have proposed that 28 respondents (7.3%) had suicidal thoughts within the last 12-month period. In the South America context, prior research by Torres, Campos, Lima and Ramos-Cerqueira (2018) in Brazil on 475 medical students from first year to sixth year have revealed that suicidal ideation was common among Brazilian medical students with 7.2%. On top of that, research by Ahmed, Omar and Abo Elamaim (2016) in Egypt on 612 first year medical students have identified that 12.75% of medical students in Egypt had high suicidal ideations. Out of these respondents, 22 of them (3.59%) had at least planned to commit suicide once and 17 of them (2.78%) had considered a plan to commit suicide during the past 48 hours.

In Asia context, surveys conducted by Sobowale, Zhou, Fan, Liu & Sherer (2014) at one medical school in mainland China on 348 second- and third-year medical students have demonstrated that 26 respondents (7.5%) showed the presence of suicidal ideation. Likewise, Sun et al. (2017) have performed a similar series of study in China with a greater sample size of 2198 medical students from first year to final year demonstrated that the prevalence of suicidal ideation, plan and attempt among the respondents were 17.9%, 5.2% and 4.3% respectively. The difference in prevalence of suicidal ideation between these two studies that carried out in China was due to the different number and year of medical education of respondents being selected. In other words, the prevalence of suicidal ideation in the studies of Sun et al (2017), has appeared to be higher than (Sobowale et al., 2014). This was because the number and year of medical education of respondents being recruited in Sun et al (2017), was more than Sobowale et al. (2014). In addition, Ghazanfar et al (2016), have concluded that about 6.8% of medical student had suicidal ideation in Pakistan. Based on a study administered in Nepal on 343 medical students from first year to fourth year, it has stressed that 16 students (4.7%) seriously considered committing suicide during medical school (Adhikari et al., 2017). In the Malaysia context, Tan et al (2015), have noted that the prevalence of suicidality among undergraduate medical students was 7.0%. This finding is supported by Mazlan and Lee (2022), which found that depression and suicidal ideation have a positive correlation among university students. Given all the studies on suicidal ideation that

have been mentioned so far, one may suppose that the prevalence of suicidal ideation from different countries worldwide which ranged from 4.7% to 17.9% of the respondents reported having suicidal ideation during medical school. This finding was hard to explain whereby the diversity in socio-cultural aspects may be responsible.

**Factors, Predictors and Effects of Depression**

In recent years, there has been a considerable and growing body of literature that has evaluated depression in terms of its factors and predictors (e.g. academic performance) as well as its effects (e.g. low quality of life and burnout) among medical students in contemporary societies. In Pakistan, Waqas et al (2015), have proposed that depression was positively linked to age, idealization, passive aggression, isolation, devaluation, and somatization. Plus, academic performance and levels of depression were correlated whereby students with lower depression levels have better academic performance than those with moderate or severe depression. In Saudi Arabia, prior research by Kulsoom and Afsar (2015), on 575 medical students by using DASS-21 has proved that medical students tend to be depressed due to difficulties in academics and develop a fear of failure or losing their scholarship. In return, a high prevalence of depression could result in burnout and hence influence their performance, progress, or personal life. The finding from Waqas et al (2015), corroborates and is consistent with the ideas of Kulsoom and Afsar (2015), where both studies have described the association between academic performance and depression among medical students.

In the Malaysian context, depression was related poorer quality of life. Medical students with depressive symptoms tend to have lower physical, psychological, and environmental domain scores (Gan & Hue, 2019). Francis et al (2019), have viewed that Malaysian medical students have higher tendency of depression because of stressful exam-oriented environments prevalent among them who perceive academic excellence as the benchmark of a sound and safe doctor. Thus, the findings from the Malaysian context were greatly similar and mirrored with the findings from other countries like Pakistan and Saudi Arabia. This was supported by the fact that stressful exams act as one of the main determinants of academic performance which further measure the severity of depression among medical students. It has been conclusively shown that the higher level of depression was related to increasing age and low socioeconomic standards in Egypt (Abdel Wahed & Hassan, 2016). In Malaysia, Gan and Hue (2019), have proposed that there was no difference in the prevalence of depression and ethnicity. Marital status, religion and household income did not significantly link to depression.

**Prevalence of Depression**

In recent years, there has been an increasing amount of literature on the prevalence of depression in medical students from many countries such as India, Egypt, Brazil, Pakistan, Saudi Arabia, China and Malaysia using instruments such as DASS-42, DASS-21, BDI, HADS, PHQ-9 and so on. According to a cross-sectional survey carried out by Iqbal, Gupta and Venkatarao (2015) in India on 353 medical students using Depression, Anxiety and Stress Scale – 42 (DASS-42) highlighted that more than half of the respondents were influenced by depression (51.3%). A large-scale cross-sectional study by Abdel Wahed and Hassan (2016) in Egypt on 442 first to fourth academic year students using the Depression, Anxiety and Stress

Scale – 21 (DASS-21) has underlined that the prevalence of depression was discovered among 64.3% of medical students.

Despite using two different versions of DASS, no significant difference was observed between these two studies in the percentage of respondents being affected by depression possibly due to the large sample size or difference in race between both studies. Moreover, the application of Beck Depression Inventory (BDI) was quite common in determining the prevalence of depression. For instance, previous research by Ibrahim and Abdelreheem (2014) in Egypt on 164 first year medical students using BDI indicated that 32 respondents (19.5%) were within the normal depression level whereas 37 (22.6%), 34 (20.7%), 40 (24.4%), 19 (11.6%) and 2 (1.2%) suffer from mild mood disturbance, borderline clinical depression, moderate, severe, and extreme depressions respectively. Thus, 95 respondents (57.9%) suffer from depression in line with BDI questionnaire cut-off point. This was supported by another major study using BDI as well by Serra et al. (2015) in Brazil on 657 first to sixth year medical students stated that the prevalence of depressive symptoms was 30% whereby 457 (69.6%), 155(23.5%), 38(5.8%) and 7(1.1%) with no, mild, moderate, and severe depressive symptoms respectively.

Besides, another cross-sectional study in Malaysia context has been conducted by Fuad et al. (2016) on 676 medical students from Year 1 to Year 5 using BDI. The findings have argued that 303 (45%), 153 (22.7%), 75 (11.1%), 91 (13.5%), 30 (4.5%) and 21 (3.1%) suffer from normal depression, mild mood disturbance, borderline clinical depression, moderate depression, severe depression and extreme depression respectively. Hence, the 220 respondents (32.5%) suffer from depression according to the BDI questionnaire cut-off point.

There were significant differences in findings between studies from Fuad et al (2016), and Serra et al. (2015) with the study from Ibrahim and Abdelreheem (2014). In other words, studies conducted by Fuad et al (2016), and Serra et al (2015), have indicated a slightly higher percentage of prevalence of depression as compared to a study from Ibrahim and Abdelreheem (2014). This was mainly due to a lesser sample size being selected by Ibrahim and Abdelreheem (2014) which was 164 respondents or merely emphasizes on first year medical students. Nevertheless, numerous studies have attempted to investigate the prevalence of depression by using instruments such as Patient Health Questionnaire – 9 (PHQ – 9). For example, Adhikari et al. (2017) have clarified that the prevalence of depression to be 29.2% using PHQ-9 among 343 first to fourth year medical students in Nepal. Sobowale et al. (2014) provide additional support for determining the prevalence of depression using PHQ9. They have revealed that out of the 348 total respondents, 122 (35.1%) had no to minimal depression, 179 (51.4%) had mild depression, and 47 (13.5%) had moderate-severe depression. Several studies have examined the prevalence of depression using Hospital Anxiety and Depression Scale (HADS). For instance, a cross-sectional study carried out by Waqas et al. (2015) in Pakistan on 409 medical students using HADS. They have concluded that 83 respondents (20.3%) were borderline depressed, and 35 respondents (8.6%) were severely depressed.

In the Malaysian context, Francis et al (2019), have shown that the prevalence of depressive symptoms was 17.4% whereby 21.9% has mild depressive symptoms and 0.3 % exhibited severe depressive symptoms by using HADS. Also, a cross-sectional study in the

Malaysia context associated with determining the prevalence of depression using HADS by Gan and Hue (2019) on 149 medical students have described that the prevalence rates of depression were 11% whereby 3.4% had significant symptoms of depression. Hence, study by Francis et al (2019), in Malaysia have indicated that the prevalence of severe depression among medical students were lower than study conducted by Waqas et al. (2015) in Pakistan even though using HADS This discrepancy could be attributed to Pakistanis medical students in Pakistan were exposed to poor family environment and greater political instability as compared to Malaysian medical students. In fact, the differences in the prevalence of depression may be due to different tools or instruments being utilized. Besides, these tools or instruments were developed to identify the patients that were at risk in general practice rather than identifying seemingly healthy students.

**Gender and Depression**

Data from several studies have identified that gender reported having a significant relationship with depression in countries like Brazil, Australia, Egypt, Pakistan, and Malaysia as well. Brenneisen Mayer et al (2016), performed a cross-sectional study in Brazil on 1650 medical students from 22 Brazilian medical schools nationwide. They have concluded that several explanations for a higher prevalence of depression in female medical students than male medical students include cultural factors linked to social stigma and gender inequity, personality traits, conflicting role demands, environment of medical school as well as medical practices and training.

Two studies by Brenneisen Mayer et al (2016), and Bore, Kelly and Nair (2016), who carried out a study in an Australian among 127 medical students had agreed that female medical students were found to have higher levels of depression, anxiety, and stress as measured by the DASS. Ibrahim and Abdelreheem (2014), also revealed that the higher depressive symptoms in female medical students in Egypt were possible because of females more inclined to complain more about the high academic load, stress, physical and psychological symptoms as well as faced fewer job opportunities than males in eastern countries. However, some research findings were contrary to the above findings which discovered no gender differences in depressive symptoms. Abdel Wahed and Hassan (2016), have indicated that there were no gender differences in depression among medical students in Egypt. Besides, Gan and Hue (2019), have also shown further evidence that gender did not significantly link to depression in Malaysia.

Despite conducted the studies in the same country (i.e. Egypt), the findings portrayed by Abdel Wahed and Hassan (2016), were contradicted with Ibrahim and Abdelreheem (2014). The explanations for these distinguishable findings could be due to different inclusion criteria in respondents being selected. The respondents in the study of Abdel Wahed and Hassan (2016), have emphasized 442 first to fourth year medical students whilst Ibrahim and Abdelreheem (2014), have focused on 164 first year medical students. On the other hand, some studies contradicted to the above findings which claimed that male medical students were vulnerable to depressive symptoms and suffered from high depression as compared to female medical students.

For instance, Gani, Gul, Haq, Firdous and Ahmad (2018) have conducted a cross-sectional study in Pakistan on 100 medical students from third, fourth and fifth year by using

BDI. They have pointed out the high prevalence of depression among medical students with severe depression presenting amongst male students rather than female students. One of the reasons could be due to the smaller sample size they analyzed which could have possibly biased the results.

All the above studies have provided considerable insight into the relationship of gender and depression. The reason for the contradictory results was due to inconsistent data about gender difference which is most probably explained by multifactorial encompassing biological, sociocultural, or variable combinations of each. In terms of gender and suicidal ideation, Adhikari et al. (2017) have argued that there was no significant difference in suicidal ideation was discovered between male and female medical students in Nepal. Sun et al. (2017) have found that male medical students were prone to higher suicidal ideation as compared to females in China. On the contrary, Ahmed et al (2016), have demonstrated that the prevalence of suicidal ideation was higher in female medical students rather than males in Egypt. The above findings from Nepal, China and Egypt were either to imply and support the current situation in the context of Malaysia even though vary culture and lifestyles. Therefore, gender was taken account into this study as being the variable that determining suicidal ideation among medical students in terms of the Malaysia context to explore and investigate any hypotheses that best applied to this current study.

## Materials and Methods

*Study Design, Sampling, and Instrumentation*

This was a cross-sectional study conducted at one of the medical faculties in public university in Selangor. A total of 217 undergraduate students pursuing a Doctor of Medicine from the first to fifth year emerged was employed as the target population using purposive sampling technique because existing studies had indicated that medical students were prone to exhibit relatively higher levels of depression and suicidal ideation rather than other undergraduate students (Tan et al., 2015; Serra et al., 2015; Gan & Hue, 2019). Prior to the actual data collection, a pilot study was conducted among 30 participants to assess the feasibility of the research processes and to examine the validity and reliability of the instruments selected. Upon obtaining the study approval from the faculty, informed consent was distributed to all participants at the beginning of the survey. The demographic data (age, gender, race, religion, year of medical education, parents' age, parents' years of education, parents' employment status, family monthly income, and parental marital status) were collected from the participants.

Depression was measured by using the English version of Patient Health Questionnaire-9 (PHQ-9). The PHQ-9 is a self-administered questionnaire with criteria-based diagnoses of depression and other mental disorders commonly encountered in primary care. The questionnaire comprises nine items, with scores ranging from "0" (not at all), "1" (several days), "2" (more than half the days), to "3" (nearly every day). PHQ-9 has 61% for sensitivity and 94% for specificity in adults (Kroenke, Spitzer, & Williams, 2001). The internal reliability of the PHQ-9 is with a Cronbach's alpha of 0.89 (Spitzer et al., 1999). Meanwhile, suicidal ideation was measured by using the English version of the Beck Scale of Suicide Ideation (BSS) (Beck & Steer, 1991). The BSS is a 21-item self-report questionnaire designed to assess the severity of suicidal ideation among adolescents and adults and whether they are willing to acknowledge and share their thoughts (Kliem et. al., 2017). The BSS has an internal reliability

of Cronbach alpha coefficients of .87. The informed consent and the sets of questionnaires were distributed online to participants in the form of Google Form Link through various social media platforms including WhatsApp and Facebook. The time allocated for each participant to complete the questionnaire was approximately 10 to 15 minutes.

The Statistical Package for Social Science (SPSS) Version 25 was utilized to analyze the quantitative data in this present study. Descriptive statistics were used to describe the demographic data for personal background (age, gender, race, religion, and year of medical education), parental background (age, years of education, and employment status), and family context (family monthly income and parental marital status).

**Results**

The sociodemographic and parental characteristics of the participants are presented in Table 1. A total of 217 medical students (109 males and 108 females) with a mean age of 20.5 (range between 18 and 25 years) participated in this study. Of the total participants, 46.1% were of Malay ethnicity, while the remaining 33.6%, 16.1%, and 4.1% were Chinese, Indians, and others, respectively. Approximately two-thirds (68.2%) of the participants were in the second year to the fifth year of medical education. In terms of suicidal ideation, 66.8% (145 out of 217 participants) had moderate to high levels of suicidal ideation (M= 17.6, SD= 9.19). Based on the findings, 59.9% (130 out of 217 participants) had moderate to severe levels of depression (M= 11.4, SD= 5.9).

Table 1
*Sociodemographic and parental characteristics of the participants (N= 217)*

| **Variables** | ***n*** | **Percentage (%)** | **M (SD)** |
|---|---|---|---|
| **Age *(years old)*** | | | 20.5 (1.76) |
| ≤ 20 | 123 | 56.7 | |
| 21 - 22 | 61 | 28.1 | |
| ≥ 23 | 33 | 15.2 | |
| **Gender** | | | |
| Male | 109 | 50.2 | |
| Female | 108 | 49.8 | |
| **Race** | | | |
| Malay | 100 | 46.1 | |
| Chinese | 73 | 33.6 | |
| Indian | 35 | 16.1 | |
| Others | 9 | 4.1 | |
| **Religion** | | | |
| Islam | 100 | 46.1 | |
| Christian | 39 | 18.0 | |
| Buddhist | 58 | 26.7 | |
| Hinduism | 17 | 7.8 | |
| Others | 3 | 1.4 | |
| **Year of Medical Education** | | | |
| 1st year | 69 | 31.8 | |
| 2nd year | 56 | 25.8 | |
| 3rd year | 52 | 24.0 | |

| | | | |
|---|---|---|---|
| 4th year | 24 | 11.1 | |
| 5th year | 16 | 7.4 | |
| **Age *(years old)*** | | | |
| **Father** | | | 54.4 (4.28) |
| 46 - 53 | 94 | 43.3 | |
| 54 - 61 | 112 | 51.6 | |
| 62 – 69 | 11 | 5.1 | |
| **Mother** | | | 51.5 (3.73) |
| 43 - 49 | 59 | 27.2 | |
| 50 - 56 | 138 | 63.6 | |
| 57 – 63 | 20 | 9.2 | |
| **Years of Education** | | | |
| **Father** | | | 13.4 (3.02) |
| ≤ 10 | 20 | 9.2 | |
| 11 - 20 | 195 | 89.9 | |
| ≥ 21 | 2 | 0.9 | |
| **Mother** | | | |
| ≤ 10 | 18 | 8.3 | 13.2 (2.88) |
| 11 - 20 | 197 | 90.8 | |
| ≥ 21 | 2 | 0.9 | |
| **Employment Status** | | | |
| **Father** | | | |
| Self-employed | 43 | 19.8 | |
| Government sector | 74 | 34.1 | |
| Non-government sector | 99 | 45.6 | |
| Housemaker/Housewife | 1 | 0.5 | |
| **Mother** | | | |
| Self-employed | 29 | 13.4 | |
| Government sector | 52 | 24.0 | |
| Non-government sector | 57 | 26.3 | |
| Housemaker/Housewife | 79 | 36.4 | |
| **Family Monthly Income (RM)** | | | |
| ≤ 3000 | 77 | 35.5 | |
| 3001 - 8000 | 118 | 54.4 | |
| ≥ 8001 | 22 | 10.1 | |
| **Parental Marital Status** | | | |
| Married | 183 | 84.3 | |
| Divorced | 23 | 10.6 | |
| Single | 2 | 0.9 | |
| Widowed | 9 | 4.1 | |

Remark: M= Mean, SD= Standard Deviation

Table 2 demonstrates the correlations between sociodemographic and parental characteristics, depression, and suicidal ideation. Suicidal ideation correlated significantly with depression (r= 0.990**, p = 0.000). Apart from that, participants' age and family monthly income correlated weakly with suicidal ideation. However, no significant correlations were found between suicidal ideation, parents' age, and parents' years of education. Independent

sample t-tests were performed to evaluate gender differences in depression and suicidal ideation of medical students. Table 3 presents the means (M), standard deviations (SD), and significant t (p) value of gender differences. There was a significant gender difference in depression (p= 0.04) but no significant gender differences in suicidal ideation (p= 0.06).

Table 2
*Correlations between between sociodemographic and parental characteristics, depression, and suicidal ideation*

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. Participant's age | 1 | | | | | | | |
| 2. Father's age | .369** | 1 | | | | | | |
| 3. Father's years of education | .103 | -.066 | 1 | | | | | |
| 4. Mother's age | .334** | .763** | -.037 | 1 | | | | |
| 5. Mother's years of education | .077 | -.166* | .752** | -.075 | 1 | | | |
| 6. Family monthly income | .113 | -.121 | .579** | -.108 | .605** | 1 | | |
| 7. Depression | -.296** | .041 | .052 | .040 | .127 | -.121 | 1 | |
| 8. Suicidal ideation | -.281** | .059 | .034 | .054 | .111 | -.142* | .990** | 1 |

Remark: * $p < 0.05$, ** $p < 0.01$

Table 3
*Mean values, standard deviations, and independent sample t-test results (N= 217).*

| Variables | M (SD) | | *t* | *p* |
|---|---|---|---|---|
| | Male | Female | | |
| Suicidal ideation | 16.4 (9.44) | 18.8 (8.82) | -1.907 | 0.058 |
| Depression | 10.6 (6.06) | 12.2 (5.62) | -2.06 | 0.04 |

Remark: M= Mean, SD= Standard Deviation, * $p < 0.05$, ** $p < 0.01$

**Discussion**

In this study, we examined the level of suicidal ideation and depression among medical students in Selangor. Almost 97.7% of the participants were overwhelmed with suicidal ideation with females demonstrating a greater propensity for suicidal ideation than males. These findings could be explained whereby Xu et al. (2015) proposed that females may have a greater tendency to encounter some life events such as being unmarried, depression, being uninsured, and financial issues rather than males. This is further corroborated by a study conducted by Ibrahim and colleagues (2017) suggested that hopelessness components such as future feelings and expectations and loss of motivation, depression, anxiety, and stress were significantly linked to suicidal ideation among Malaysian females. In terms of depression, a significant proportion of participants (59.9%) had moderate to severe levels of depression. Most existing studies suggested that medical education was well recognized as

an intense and stressful education that required students to comprehend a massive amount of knowledge and skills. Medical students face numerous competitions and threats of failure to maintain excellent academic performance which might impair their physical, psychological, and social functioning (Francis et al., 2019; Gan et al., 2019; Taylor et al., 2022; Wolf & Kissling, 1984).

The study identified suicidal ideation as strongly correlated with depression. The findings echoed previous studies whereby the association between suicidal ideation and depression was statistically significant among medical students in Bangladesh, Thailand, and Italy (Pitanupong et al., 2024, Chomon, 2022; Tugnoli et al., 2022). However, a study conducted by Wang and colleagues (2017) demonstrated a weak correlation between suicidal ideation and depression among medical students as compared to students from comprehensive universities. They suggested that this situation was attributed to medical students having benefited from their curricula which enhanced their knowledge of depressive symptoms and skills of seeking assistance.

The study also demonstrated that participants' age, and family monthly income influence suicidal ideation. This finding was aligned with prior research by Ibrahim et al (2017), which confirmed that age was a predictor of suicidal ideation and was negatively associated with suicidal ideation. This finding is consistent with a study conducted by Boxer and colleagues (1995) which claimed that socioeconomic status acted as one of the risk factors for suicide ideation and thus, low socioeconomic status could be linked to suicide ideation. In addition, low family monthly income which was one of the contributing factors that led to low socioeconomic status could result in suicidal ideation among medical students.

Consistent with studies conducted by Brenneisen Mayer et al (2016), and Ibrahim et al. (2014), we observed significant mean gender differences in depression among our cohort medical students. Accordingly, the higher prevalence of depression in female medical students than in male medical students involved cultural factors linked to social stigma and gender inequity, personality traits, and conflicting role demands. Meanwhile, we observed no significant mean gender differences in suicidal ideation. This finding lent support to previous findings conducted by Adhikari et al (2017), and Pereira and Cardoso (2015). However, another study suggested that females are inclined to be a risk factor for suicidal ideation in medical students and are more vulnerable to suicidal ideation (Coentre & Góis, 2018).

Despite the notable findings from this study, there are several limitations to improve in future studies. First, the generalization of the findings was limited due to a small sample size and merely focused on a public university. Thus, it was recommended that a larger sample size and wider study location comprising both private and public universities should be adopted in future research. Second, no cause-and-effect relationship was demonstrated as the design of this study was a cross-sectional study. Therefore, it was of utmost importance for future researchers to investigate this topic from a longitudinal perspective to identify development trends or changes in the target population. Finally, the risk factors and protective factors for both suicidal ideation and depression as well as how those factors could influence genders were not penetrated in detail. Multiple risks and protective factors such as hopelessness, personality traits, locus of control, family history, and mental health issues are worth to be examined in the future.

## Conclusion

This present study demonstrated that medical students in one of the public universities in Selangor, Malaysia exhibited moderate to severe levels of depression and suicidal ideation measured using the Patient Health Questionnaire-9 (PHQ-9) and Beck Scale of Suicide Ideation (BSS). There was a significant gender difference in depression but no significant gender difference in suicidal ideation. Participant's age, family monthly income, and depression were correlated with suicidal ideation. Future studies are warranted to allow systematic documentation of depression and suicidal ideation among this population. This information has a pivotal role in the development of tailored interventions to alleviate the level of depression and suicidal ideation among university students especially medical students in Malaysia.

## References

Adhikari, A., Dutta, A., Sapkota, S., Chapagain, A., Aryal, A., & Pradhan, A. (2017). Prevalence of poor mental health among medical students in Nepal: A cross sectional study. *BMC Medical Education, 17*(1).

Aning, F. A., Budull, C. R., Sabturani, N., Ahing, T., & Talip, N. K. A. (2021). Depression and Suicidal Ideation among University Students. *International Journal of Academic Research in Business and Social Sciences,* 11(12), 1995–2004.

Atienza-Carbonell, Beatriz, and Vicent Balanzá-Martínez. (2020). "Prevalence of Depressive Symptoms and Suicidal Ideation Among Spanish Medical Students". *Actas Españolas De Psiquiatría*, vol. 48, no. 4, July 2020, pp. 154-62, https://actaspsiquiatria.es/index.php/actas/article/view/314.

Bachmann S. (2018). Epidemiology of suicide and the psychiatric perspective. *International Journal of Environmental Research and Public Health, 15*(7), 1425.

Bárbara Santos Pereira Neres1, Maria Luiza Andrade Aquino, Vinicius Sousa Pietra Pedroso (2021). Prevalence and factors associated to depression and suicidal behaviour among medical students. DOI: 10.1590/0047-2085000000351

Beck, A. T., & Steer, R. A. (1991). *BSI, Beck Scale for Suicide Ideation: Manual*. San Antonio, TX: Psychological Corp.

Boxer, P. A., Burnett, C., & Swanson, N. (1995). Suicide and occupation: A review of the literature. *Journal of Occupational and Environmental Medicine, 37*(4), 442-452.

Bradvik L. (2018). Suicide risk and mental disorders. *International Journal of Environmental Research and Public Health, 15*(9), 2028.

Brenneisen Mayer, F., Souza Santos, I., Silveira, P. S., Itaqui Lopes, M. H., de Souza, A. R., Campos, E. P., de Abreu, B. A., Hoffman Ii, I., Magalhães, C. R., Lima, M. C., Almeida, R., Spinardi, M., & Tempski, P. (2016). Factors associated to depression and anxiety in medical students: a multicenter study. *BMC Medical Education, 16(*1), 282.

Chomon RJ (2022) Depression and suicidal ideation among medical students in a private medical college of Bangladesh. A cross-sectional web-based survey. *PLoS one* 17(4): e0265367. https://doi.org/10.1371/journal.pone.0265367

Coentre, R., & Góis, C. (2018). Suicidal ideation in medical students: recent insights. *Advances in Medical Education and Practice*, *9*, 873-880.

Desai, N. D., Chavda, P., Shah, S. Prevalence and predictors of suicide ideation among undergraduate medical students from a medical college of Western India. (2021). *Med J Armed Forces India*. 77 (Suppl 1): S107-S114. doi: 10.1016/j.mjafi.2020.11.018. Epub 2021 Feb 2. PMID: 33612940; PMCID: PMC7873708.

Desalegn, G. T., Wondie, M., Dereje, S., & Addisu, A. (2020). Suicide ideation, attempt, and determinants among medical students Northwest Ethiopia: an institution-based cross-sectional study. *Annals of General Psychiatry, 19*, 44.

Desalegn, G. T., Wondie, M., Dereje, S. (2020). Suicide ideation, attempt, and determinants among medical students Northwest Ethiopia: an institution-based cross-sectional study. *Ann Gen Psychiatry* 19, 44. https://doi.org/10.1186/s12991-020-00295-2

Dwivedi N, Sachdeva S, Taneja N. (2021). Depression among medical students of India: Meta-analysis of published research studies using screening instruments. *Indian J Soc Psych*, 37(2):183-90.

Eskin, M., Sun, J. M., Abuidhail, J., Yoshimasu, K., Kujan, O., Janghorbani, M., Flood, C., Carta, M. G., Tran, U. S., Mechri, A., Hamdan, M., Poyrazli, S., Aidoudi, K., Bakhshi, S., Harlak, H., Moro, M. F., Nawafleh, H., Phillips, L., Shaheen, A., Taifour, S., Voracek, M. (2016). Suicidal Behavior and Psychological Distress in University Students: A 12-nation Study. *Journal of the International Academy for Suicide Research, 20*(3), 369-388.

Francis, B., Gill, J. S., Yit Han, N., Petrus, C. F., Azhar, F. L., Ahmad Sabki, Z., Said, M. A., Ong Hui, K., Chong Guan, N., & Sulaiman, A. H. (2019). Religious coping, religiosity, depression, and anxiety among medical students in a multi-religious setting. *International Journal of Environmental Research and Public Health,* 16(2), 259.

Gan, G. G. & Hue, Y. L. (2019). Anxiety, depression, and quality of life of medical students in Malaysia. *Medical Journal of Malaysia, 74*(1), 57-61.

Ibrahim, M. B., & Abdelreheem, M. H. (2014). Prevalence of anxiety and depression among medical and pharmaceutical students in Alexandria University. Alexandria *Journal of Medicine, 51*(2), 167-173.

Ibrahim, N., Amit, N., Che Din, N., & Ong, H. C. (2017). Gender differences and psychological factors associated with suicidal ideation among youth in Malaysia. *Psychology Research and Behavior Management, 10*, 129-135.

Ikeoluwapo Kendra Bolakale-Rufai. (2023), Depression and suicidal ideation among medical students. *Journal of Global Medicine*. https://doi.org/ 10.51496/jogm. v2.87

Ikhsan, D. S., Prananjaya. B. A., et al. (2022). "Suicide in Medical Student: How To Prevent?". *Jurnal Psikiatri Surabaya*, vol. 11, no. 2, pp. 62-67 2022, doi: 10.20473/jps.v11i2.39874

Islam, S., Akter, R., Sikder, T., Griffiths, M. D. (2020). Prevalence and factors associated with depression and anxiety among first-year university students in Bangladesh: a cross-sectional study. *Int J Ment Health Ad*.:1-4.

Kaggwa, M. M., Najjuka, S. M., Favina, A., Griffiths, M. D., & Mamun, M. A. (2022). Suicidal behaviors and associated factors among medical students in Africa: A systematic review and meta-analysis. *Journal of Affective Disorders Reports*, 11, 100456. https://doi.org/10.1016/j.jadr.2022.100456

Keuch, L., Pukas, L., Rabkow, N., Ehring, E., Kindt, T., Rehnisch, C., Pelzer, A., Lamlé, P., & Watzke, S. (2023). Beck's Depression Inventory II Suicidal Ideation in Medical Students – Prevalence and Associated Factors*. International Journal of Medical Students*, 11(1), 38–44. https://doi.org/10.5195/ijms.2023.1434.

Kliem, S., Lohmann, A., Mößle, T., & Brähler, E. (2017). German Beck Scale for Suicide Ideation (BSS): Psychometric properties from a representative population survey. *BMC Psychiatry, 17*(1), 389.

Klonsky, E. D., May, A. M., & Saffer, B. Y. (2016). Suicide, suicide attempts, and suicidal ideation. *Annual Review of Clinical Psychology, 12*, 307-330.

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine, 16*(9), 606-613.

Lee, L. , Roser, M. & Esteban, O.O. (2017). Suicide. Our World in Data. Retrieved March 13, 2019, from https://ourworldindata.org/suicide#

Maniam, T., Marhani, M., Firdaus, M., Kadir, A. B., Mazni, M. J., Azizul, A., Salina, A. A., Fadzillah, A. R., Nurashikin, I., Ang, K. T., Jasvindar, K., & Noor Ani, A. (2014). Risk factors for suicidal ideation, plans and attempts in Malaysia--results of an epidemiological survey. *Comprehensive Psychiatry, 55 Suppl 1*, S121-S125.

Mann, J. J., Waternaux, C., Haas, G. L., & Malone, K. M. (1999). Toward a clinical model of suicidal behavior in psychiatric patients. *The American Journal of Psychiatry, 156*(2), 181-189.

Matheson, K. M., Barrett, T., Landine, J., McLuckie, A., Soh, N. L. W., & Walter, G. (2016). Experiences of Psychological Distress and Sources of Stress and Support during Medical Training: A Survey of Medical Students. *Academic Psychiatry, 40*(1), 63-68.

Mazelan, M. A. F. B., & Lee Jun Choi. (2022). The Prevalence and Correlates of Suicidal Ideation among University Students: A Survey. *Journal of Cognitive Sciences and Human Development*, 8(1), 157–174. https://doi.org/10.33736/jcshd.4374.2022

Miguel, A. Q. C., Tempski, P., Kobayasi, R., Mayer, F. B., & Martins, M. A. (2021). Predictive factors of quality of life among medical students: Results from a multicentric study. *BMC Psychology, 9*(1), 36.

Mortier, P., Cuijpers, P., Kiekens, G., Auerbach, R. P., Demyttenaere, K., Green, J. G., Kessler, R. C., Nock, M. K., & Bruffaerts, R. (2018). The prevalence of suicidal thoughts and behaviors among college students: A meta-analysis. *Psychological Medicine*, *48*(4), 554-565.

Nan, J., Salina, N., Chong, S. T., & Jiang, H.-j. (2023). Trajectory of suicidal ideation among medical students during the COVID-19 pandemic: The role of childhood trauma. *BMC Psychiatry*, 23, Article 90. https://doi.org/10.1186/s12888-023-04582-6

NSRM, Ministry of Health Malaysia (2011). National Suicide Registry Malaysia (NSRM) Annual Report for 2009.

Olum R, Nakwagala FN, Odokonyero R. (2020). Prevalence and factors associated with depression among medical students at Makerere university, Uganda. *Adv Med Educ Pract*, 11:853-860.

Pereira, A., & Cardoso, F. (2015). Suicidal ideation in university students: Prevalence and association with school and gender. *Paideia, 25*(62), 299-306.

Phomprasith S, Karawekpanyawong N, Pinyopornpanish K, Jirapornchar- oen W, Maneeton B, Phinyo P, et al. Prevalence and associated factors of depression in medical students in a Northern Thailand University: a cross-sectional study. *Healthcare (Basel*). 2022;10(3):488.

Pitanupong, J., Sa-i, A., Sathaporn, K., Jiraphan, A., Ittasakul, P., & Karawekpanyawong, N. (2024). The personality traits with depression and suicidal ideation among Thai medical students: a university-based multiregional study. *BMC Psychol* 12, 223 (2024). https://doi.org/10.1186/s40359-024-01707-8.

Potter, L., Silverman, M., Connorton, E., & Posner, M. (2004). Promoting Mental Health and Preventing Suicide in College and University Settings. Presented at the Center for Mental Health Services, Substance Abuse and Mental Health Services Administration, U.S. Department of Health and Human Services: SPRC: Suicide Prevention Resource

Center. Retrieved from http://www.sprc.org/sites/sprc.org/ files/ library/college_sp_whitepaper.pdf

Pukas L, Rabkow N, Keuch L, Ehring E, Fuchs S, Stoevesandt D, et al. (2022). Prevalence and predictive factors for depressive symptoms among medical students in Germany–a cross-sectional study. *GMS J Med Educ*. 2022;39(1): Doc13.

Rotenstein, L. S., Ramos, M. A., Torre, M., Segal, J. B., Peluso, M. J., Guille, C., Sen, S., & Mata, D. A. (2016). Prevalence of depression, depressive symptoms, and suicidal ideation among medical students: a systematic review and meta-analysis. *JAMA, 316*(21), 2214-2236.

Seo, C., Di Carlo, C., Dong, S. X., Fournier, K., & Haykal, K.-A. (2021). Risk factors for suicidal ideation and suicide attempt among medical students: A meta-analysis. PLoS *ONE*, 16(12), Article e0261785. https://doi.org/10.1371/journal.pone.0261785.

Serra, R. D., Dinato, S. L. M. e, & Caseiro, M. M. (2015). Prevalence of depressive and anxiety symptoms in medical students in the city of Santos. *Jornal Brasileiro de Psiquiatria, 64*(3), 213-220.

Sobowale, K., Zhou, N., Fan, J., Liu, N., & Sherer, R. (2014). Depression and suicidal ideation in medical students in China: a call for wellness curricula. *International Journal of Medical Education, 5*, 31-36.

Spitzer, R., Kroenke, K., Williams, J. (1999). Validation and utility of a self-report version of PRIME-MD: The PHQ Primary Care Study. *Journal of the American Medical Association, 282*, 1737-1744.

Sun, L., Zhou, C., Xu, L., Li, S., Kong, F., & Chu, J. (2017). Suicidal ideation, plans and attempts among medical college students in china: The effect of their parental characteristics. *Psychiatry Research, 247*, 139-143.

Tan, S. T., Sidik, S. M., Rampal, L., & Ibrahim, N. (2015). Prevalence and predictors of suicidality among medical students in a public university. *Medical Journal of Malaysia, 70*(1), 1-5.

Taylor, C. E., Scott, E. J., & Owen, K. (2022). Physical activity, burnout and quality of life in medical students: A systematic review. *The Clinical Teacher, 19(*6), e13525.

Torres, A. R., Campos, L. M., Lima, M. C. P., & Ramos-Cerqueira, A. T. A. (2018). Suicidal ideation among medical students: Prevalence and predictors. *Journal Of Nervous and Mental Disease, 206*(3), 160-168.

Tugnoli, S., Casetta, I., Caracciolo, S., and Salviato, J. (2022) Parental bonding, depression, and suicidal ideation in medical students. *Front. Psychol*. 13:877306. doi: 10.3389/fpsyg.2022.877306

Varshney, K., Patel, H., & Panhwar, M. A. (2024). Risks and Warning Signs for Medical Student Suicide Mortality: A Systematic Review. *Archives of Suicide Research*, 1–19. https://doi.org/10.1080/13811118.2024.2310553

Wang, Y. H., Shi, Z. T., & Luo, Q. Y. (2017). Association of depressive symptoms and suicidal ideation among university students in China: A systematic review and meta-analysis. *Medicine*, *96*(13), e6476.

Watson, C., Ventriglio, A., & Bhugra, D. (2020). A narrative review of suicide and suicidal behavior in medical students. *Indian Journal of Psychiatry*, 62(3), 250–256. https://doi.org/10.4103/psychiatry.IndianJPsychiatry_357_20

Wege, N., Muth, T., Li, J., & Angerer, P. (2016). Mental health among currently enrolled medical students in Germany. *Public Health, 132*, 92-100.

Wilcox, H. C., Arria, A. M., Caldeira, K. M., Vincent, K. B., Pinchevsky, G. M., & O'Grady, K. E. (2010). Prevalence and predictors of persistent suicide ideation, plans, and attempts during college. *Journal of Affective Disorders, 27*(1-3), 287-294.

Wolf, T. M., & Kissling, G. E. (1984). Changes in life-style characteristics, health, and mood of freshman medical students. *Academic Medicine, 59*(10), 806-814.

World Health Organisation (2018). Suicide. Retrieved from https://www.who.int/news-room/factsheets/detail/suicide

World Health Organization. (2021).) Suicide. Who.int. World Health Organization: WHO; 2021. https://www.who.int/news-room/fact-sheets/detail/suicide

World Health Organization. (2022). Suicide mortality (per 100 000 population). Who.int. World Health Organization; WHO; 2022. https://data.who.int/indicators/i/16BBF41Xu

World Health Organization. Suicide worldwide in 2019: global health estimates. Available from: https://www.who.int/publications/i/item/9789240026643.

Xu, H., Zhang, W., Wang, X., Yuan, J., Tang, X., Yin, Y., Zhang, S., Zhou, H., Qu, Z., & Tian, D. (2015). Prevalence and influence factors of suicidal ideation among females and males in Northwestern urban China: A population-based epidemiological study. *BMC Public Health, 15*, 961.

Yang, L. S., Zhang, Z. H., Sun, L., Sun, Y. H., & Ye, D. Q. (2015). Prevalence of suicide attempts among college students in China: a meta-analysis. *PloS one, 10*(2), e0116303.

Zatt, W. B., Lo, K. (2023) Pooled prevalence of depressive symptoms among medical students: an individual participant data meta-analysis. *BMC Psychiatry* 23, 251 (2023). https://doi.org/10.1186/s12888-023-04745-5