

Suicide attempts among children and adolescents admitted to a Polish Emergency Department: Analysis of epidemiology, circumstances and methods of 154 cases

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Conflict of interest

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Abstract

Background. Suicide attempts among pediatric patients are currently one of the most critical issues in modern psychiatry and emergency medicine, and constitute a serious public health problem that affects people of almost every age group. It is often emphasized that attempted suicide is a cry for help, and according to international studies, the pandemic year of 2020 massively impacted the frequency of suicide attempts among children. However, such studies have yet to appear in Poland.

Objectives. To characterize the frequency, circumstances and methods of suicide attempts among children and adolescents, and investigate their relationship with coronavirus disease 2019 (COVID-19).

Materials and methods. The study retrospectively analyzed the medical records of 154 children admitted to the Emergency Department due to suicide attempts between January 2020 and June 2021.

Results. No statistical relationship was found between the direct impact of the pandemic and suicide attempts among children and adolescents. However, age and gender influenced the methods used and the frequency of suicide attempts. Females are more likely to attempt suicide than males, and patients as young as 8 tried to take their own lives.

Conclusions. Due to the increasing frequency of suicide attempts in children and adolescents, people at particular risk of such behaviors should be identified and provided with effective care. Unfortunately, although the vast majority of pediatric patients who attempted suicide had psychiatric consultations in the past, it did not prevent them from actively trying to end their lives. Furthermore, even children of a very young age are at risk of suicide events.

Key words: psychiatry, emergency medicine, pediatrics, self-harm, mental health

Background

Suicide is the 2nd leading cause of mortality among young people aged 10–24 worldwide.¹ A suicide attempt is an independent, potentially lethal act with the intent to take one's own life.² Attempted suicide is a serious public health problem, affecting people from almost every age group,³ and a significant problem in children and adolescents, influenced by complex factors.^{3,4} Such factors include, but are not limited to, social and psychological issues, mental diseases and addictions (Fig. 1).³ Fortunately, death by suicide is a relatively rare event compared to attempted suicide.⁴ As such, the number of suicide attempts is incomparably greater than committed (accomplished) suicides, although the frequency of such attempts remains underestimated. Thoughts of suicide and attempted suicide are well-known risk factors for death by suicide, and suicidal thoughts, attempted suicide and death by suicide can create a continuum of suicidality.⁵

In December 2019, the first case of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection was reported in Wuhan, China,^{6,7} and on March 11, 2020, the World Health Organization (WHO) announced the outbreak of a global pandemic.⁸ To date, 640 million people worldwide have contracted coronavirus disease 2019 (COVID-19), and more than 6.6 million people have died from the infection.⁹ The pandemic created new challenges for healthcare, and isolation, quarantine, school closures, as well as high risk of transmission of infections significantly affected the mental health of young people in particular.¹⁰ Indeed, the COVID-19 epidemic significantly impacted the mental state of society, particularly by exacerbating depression and anxiety.¹¹

Suicide attempts among pediatric patients are one of the most important issues in modern psychiatry and

emergency medicine, and the number of suicide attempts may have increased during the pandemic. Indeed, international studies indicate an increase in the frequency of suicide attempts among children during the pandemic year of 2020.^{10,12} Several papers on the risk factors for suicide attempts among children and adolescents during the COVID-19 pandemic demonstrate that they may have been particularly affected by containment measures, such as physical distancing. Furthermore, lack of contact with schools, teachers and peers, difficulties obtaining or continuing psychiatric treatment, a more frequent use of narcotics, and anxiety related to family health and economic problems are the most frequently mentioned reasons for the increased risk of suicide attempts in children and adolescents.^{13,14} Moreover, some studies suggest that increased awareness of suicidal thoughts and behaviors by parents, due to spending more time at home, resulted in children being taken to hospital more often.¹³ However, such studies have yet to be conducted in Poland.

Objectives

This study analyzed the frequency, circumstances and methods of suicide attempts among children and adolescents admitted to the Pediatric Emergency Department of the Medical University of Warsaw (MUW), Poland. In addition, the study considered the impact of the COVID-19 pandemic on suicide rates.

Materials and methods

Study design and setting

This single-center retrospective study analyzed medical records of children and adolescents admitted to the Emergency Department of the Pediatric Teaching Clinical Hospital of the University Clinical Center of the MUW. This hospital is the highest referral pediatric center in Poland and one of the 2 psychiatry centers for children up to 14 years of age for the Masovian and Podlaskie Voivodeships. Additionally, as the only children's trauma center in the region, the hospital receives a large proportion of the most seriously injured children.¹⁵ The data analyzed in the study were collected between January 2020 and June 2021.

Ethical approval

The study conformed with the Declaration of Helsinki, European Union directives and the standards required by biomedical journals. The Bioethics Committee of the MUW (approval No. AKBE/108/2021 of July 2, 2021) and the hospital management approved the study.

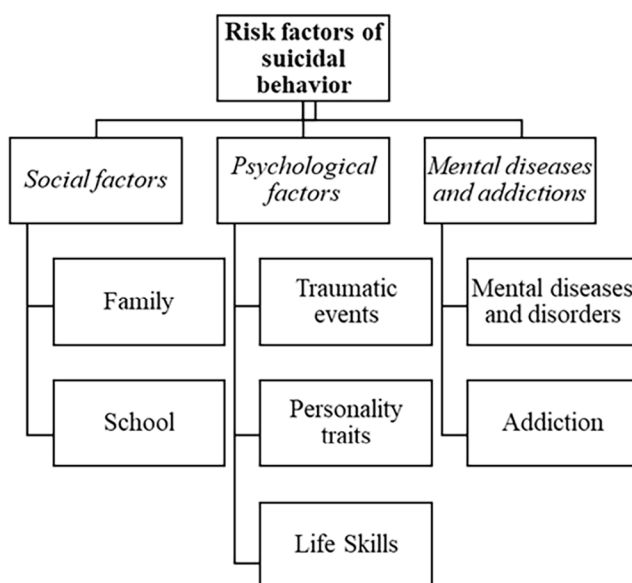


Fig. 1. Risk factors for suicidal behavior. Data are taken from the study by Marzec et al.³

Participants

Patients admitted to the emergency department requiring psychiatric consultation were selected, with the hospital's electronic medical documentation system used to collect the data, resulting in the inclusion of 154 subjects for whom all necessary data were available. The criteria for patient exclusion were: age >18 years, a suicide attempt in the previous 48 h, incomplete patient data, and any condition preventing psychiatrist examination, such as consciousness disorders or loss of consciousness. The exclusion criterion of a suicide attempt within the last 48 h ensured consistency with other studies.^{16,17} A lack of full documentation resulted in exclusion of only 2 patients.

Data sources

Detailed information on the mental state of the child and its psychiatric history was obtained on the basis of a psychiatric consultation conducted by a child psychiatrist. The eligibility criteria for inclusion were complete medical records containing age and gender, details on suicidal behaviors, and thoughts reported by the patients such as talking about wanting to die or commit suicide, looking for suicide methods, talking about feeling hopeless, or having no reason to live. Other required information included details of previous suicide attempts, prior psychiatrist intervention, diagnosis of a mental disorder, family history of mental disorders, and any addictions. Moreover, data included the patient's family situation, such as whether the child came from a complete family, could count on parental support by asking if they rely on their caregivers, and whether the attempted suicide was related to the prevailing COVID-19 pandemic.

The link between the decision to attempt suicide and the COVID-19 pandemic was based on, among others, fear of a pandemic, problems with learning at school, issues with isolation and lack of contact with people outside the immediate family, and exacerbation of financial or family problems due to the pandemic. This information was obtained from the psychiatric consultations and interviews with parents, available in the records. Other data on attempted suicide included the method used, information on whether the child acted to take their life, if the child required hospitalization due to the resulting injuries, and if the child was immediately admitted to a psychiatric department.

Statistical analyses

Statistical analysis employed IBM SPSS software v. 26.0 (IBM Corp., Armonk, USA). Categorical variables were summarized as frequency tables, range and mean \pm standard deviation ($M \pm SD$). The relationships between the variables were examined using the χ^2 test, while the strength

of dependence was investigated using the Phi-Yule coefficient and the Cramer's V coefficient, the results of which included 95% confidence interval (95% CI). A p-value <0.05 was considered statistically significant.

Results

Table 1 describes the statistical results for the compared values. The study included 123 females (79.9%) and 31 males (20.1%). Participants were divided into age groups of 8–13 years ($n = 73$) and 14–17 years ($n = 81$), since patients get admitted to psychiatric youth centers from the age of 14. The mean age for females was 13.8 years (median: 14 years, SD: ± 1.64 , minimum: 8 years, and maximum: 17 years). The mean age for males was 13.7 years (median: 14 years, SD: ± 2.07 , minimum: 8 years, and maximum: 17 years). The youngest recorded patient with a suicide attempt was 8 years old (Table 1).

Most of the children investigated were admitted after their first suicide attempt (64.3%, $n = 99$), with the first attempt being more common in males (77.4%, $n = 24$) than females (61%, $n = 75$). The majority of children (81.2%, $n = 125$) had previously experienced suicidal behavior or thoughts, or both. Suicidal thoughts were more frequent in those aged 14–17 years (85.2%, $n = 69$) than in patients aged 8–13 years (76.7%, $n = 56$). Furthermore, suicidal behavior or thoughts, or both, were found more frequently in females (85.4%, $n = 105$) and males (64.5%, $n = 20$). Moreover, the relationship between gender and suicidal behavior and thoughts was statistically significant ($\chi^2 = 7.042$, degrees of freedom (df) = 1, $p = 0.008$). However, the relationship was relatively weak (Phi-Yule coefficient = 0.214).

A large proportion of children (74.7%, $n = 115$) were previously under the care of a psychiatrist, while some (25.3%, $n = 39$) had never received such help. Females (76.4% $n = 94$) visited a psychiatrist more often than males (67.7% $n = 21$), and those aged 8–13 years (75.3%, $n = 55$) were under the care of a psychiatrist more often than those aged 14–17 years (74.1%, $n = 60$). Only 16.2% ($n = 25$) of children had an addiction, with a large proportion addicted to the Internet/computer (48%, $n = 12$), 28% ($n = 7$) to drugs such as cannabis, mephedrone and psychoactive substances, and 24% ($n = 6$) to other substances such as alcohol and nicotine. Furthermore, addiction differed significantly between males (29%, $n = 9$) and females (13%, $n = 16$).

At the time of the suicide attempt, most children (92.9%, $n = 143$) were not under the influence of intoxicants such as alcohol and psychoactive substances or pharmaceuticals used for nontherapeutic purposes, although 7.1% ($n = 11$) were. Furthermore, a statistically significant relationship was observed between age and whether the child was under the influence of intoxicants or pharmaceuticals at the time of the suicide attempt ($\chi^2 = 6.974$, df = 1,

Table 1. Characteristics of 154 Polish patients who attempted suicide

Characteristics		Age		p-value	Gender		p-value
		8–13 years (n = 73)	14–17 years (n = 81)		women (n = 123)	men (n = 31)	
Has the child attempted suicide before?	yes	23 (31.5%)	32 (39.5%)	0.301	48 (39%)	7 (22.6%)	0.134
	no	50 (68.5%)	49 (60.5%)		75 (61%)	24 (77.4%)	
Has the child had any previous suicidal behavior or thoughts?	yes	56 (76.7%)	69 (85.2%)	0.179	105 (85.4%)	20 (64.5%)	0.008
	no	17 (23.3%)	12 (14.8%)		18 (14.6%)	11 (35.5%)	
Has the child been previously looked after by a psychiatrist?	yes	55 (75.3%)	60 (74.1%)	0.857	94 (76.4%)	21 (67.7%)	0.446
	no	18 (24.7%)	21 (25.9%)		29 (23.6%)	10 (32.3%)	
Is the child addicted?	yes	13 (17.8%)	12 (14.8%)	0.615	16 (13%)	9 (29%)	0.059
	no	60 (82.2%)	69 (85.2%)		107 (87%)	22 (71%)	
Was the child under the influence of intoxicants/pharmaceuticals at the time of the suicide attempt?	yes	1 (1.4%)	10 (12.3%)	0.010	8 (6.5%)	3 (9.7%)	0.464
	no	72 (98.6%)	71 (87.7%)		115 (93.5%)	28 (90.3%)	
Can a child count on parental support?	yes	63 (86.3%)	70 (86.4%)	1.000	107 (87.0%)	26 (83.9%)	0.769
	no	10 (13.7%)	11 (13.6%)		16 (13.0%)	5 (16.1%)	
Is the child diagnosed with a mental disorder?	yes	20 (27.4%)	27 (33.3%)	0.424	36 (29.3%)	11 (35.5%)	0.502
	no	53 (72.6%)	54 (66.7%)		87 (70.7%)	20 (64.5%)	
Have any mental disorders occurred in the child's family?	yes	9 (12.3%)	6 (7.4%)	0.312	12 (9.7%)	3 (9.7%)	1.000
	no	51 (69.9%)	69 (85.2%)		97 (78.9%)	23 (74.2%)	
	lack of knowledge	13 (17.8%)	6 (7.4%)		14 (11.4%)	5 (16.1%)	
Method of attempted suicide	poisoning	23 (31.5%)	47 (58%)	0.007	59 (48%)	11 (35.5%)	0.006
	suicidal self-injury	24 (32.9%)	18 (22.2%)		38 (30.9%)	4 (12.9%)	
	jumping from height	12 (16.4%)	5 (6.2%)		9 (7.3%)	8 (25.8%)	
	other	14 (19.2%)	11 (13.6%)		17 (13.8%)	8 (25.8%)	
Has the child self-harmed before to reduce stress and tension or gain attention?	yes	37 (50.7%)	38 (46.9%)	0.640	68 (55.3%)	7 (22.6%)	0.002
	no	36 (49.3%)	43 (53.1%)		55 (44.7%)	24 (77.4%)	
Has the COVID-19 pandemic affected the child's suicide attempt?	yes	17 (23.3%)	20 (24.7%)	0.839	32 (26%)	5 (16.1%)	0.359
	no	56 (76.7%)	61 (75.3%)		91 (74%)	26 (83.9%)	
Did the child require hospitalization as a result of injuries during a suicide attempt?	yes	5 (6.8%)	18 (22.2%)	0.008	19 (15.4%)	4 (12.9%)	1.000
	no	68 (93.2%)	63 (77.8%)		104 (84.6%)	27 (87.1%)	

COVID-19 – coronavirus disease 2019. Values in bold indicate statistically significant results.

$p = 0.010$). However, the relationship was relatively weak (Phi–Yule coefficient = 0.213). Children aged 14–17 years were under the influence of substances more frequently when attempting suicide (12.3%, $n = 10$). There was $n = 1$ (1.4%) case in the age group 8–13.

Most hospitalized children came from a complete family (55.8%, $n = 86$), while 41.6% ($n = 64$) of children grew up in an incomplete family. Data on the family status of 4 patients (2.6%) could not be obtained. Children aged 14–17 years came from a complete family more often (60.5%, $n = 49$) than children aged 8–13 years (50.7%, $n = 37$). Furthermore, 86.4% ($n = 133$) of children could rely on their parents' support, while 13.6% ($n = 21$) did not receive such support. The majority of surveyed children have not been previously diagnosed with a mental disorder (69.5%, $n = 107$), while 30.5% ($n = 47$) had a history

of mental disorder diagnosis. Most children (77.9%, $n = 120$) had no family history of psychiatric disorders, though 9.7% ($n = 15$) did, and 12.3% ($n = 19$) did not have any knowledge on the issue.

The most frequently chosen suicide method was poisoning (45.5%, $n = 70$), with self-injury ranking 2nd (27.3%, $n = 42$), followed by jumping from height (11%, $n = 17$). Other methods used by 16.2% ($n = 25$) of patients included drowning, jumping under a train and ingesting a corrosive substance. Statistical analysis revealed a significant relationship between gender and the method of suicide attempt ($\chi^2 = 13.267$, $df = 3$, $p = 0.003$), and the association was moderate (Cramer's V coefficient = 0.317). Although poisoning was the suicide attempt method used by most children, intoxication was more common in females (48%, $n = 59$) than in males (35.5%, $n = 11$) (Fig. 2). Moreover,

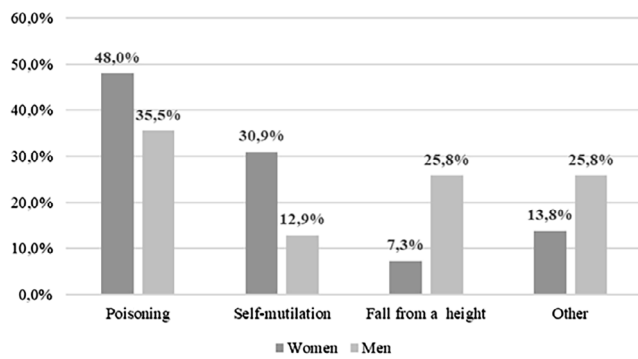


Fig. 2. Relationship between gender and the method of the suicide attempt

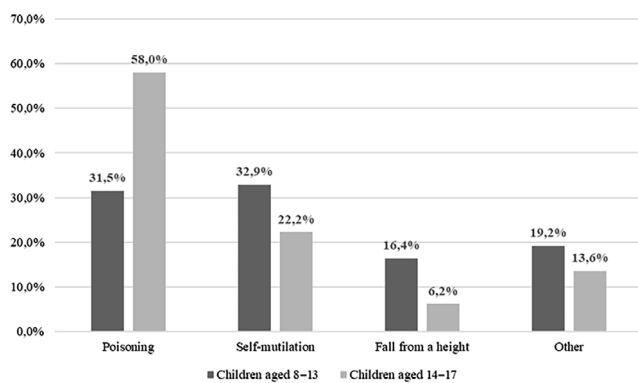


Fig. 3. Relationship between the age and the method of the suicide attempt

self-injury was the most common method among those aged 8–13 years (32.9%), while patients aged 14–17 years favored poisoning (58%) (Fig. 3). A statistically significant relationship was found between the age group and the suicide attempt method (χ^2 (df = 3) = 12.900, $p = 0.005$), though the relationship was relatively weak (Cramer's V coefficient = 0.295).

In most cases, the children in the study acted to take their own lives, not merely to attract attention. There was a statistically significant relationship between gender and whether the child had self-harmed before to reduce stress and tension or attract attention ($\chi^2 = 9.331$, $df = 1$, $p = 0.002$), although the relationship was relatively weak (Phi-Yule coefficient = 0.262). Most females (55.3%, $n = 68$) had self-harmed to reduce stress and tension or to gain attention, and 77.4% ($n = 24$) of males had not self-mutilated before. Furthermore, 50.7% ($n = 37$) of children aged 8–13 years had self-harmed previously to reduce stress and tension or to gain attention. On the other hand, most children aged 14–17 years (53.1%, $n = 43$) did not self-mutilate.

There was no clear link between SARS-CoV-2 and attempted suicide in most cases among children aged 8–13 years (76.7%, $n = 56$) and 14–17 years (75.3%, $n = 61$). Also, there was no statistically significant relationship between the age group or gender and the COVID-19 pandemic.

Hospitalization was not required in 93.2% ($n = 68$) of children aged 8–13 years and 77.8% ($n = 63$) of those aged 14–17 years as a result of their injuries. However, a weak (Phi-Yule coefficient = 0.215) but statistically significant relationship ($\chi^2 = 7.142$, $df = 1$, $p = 0.008$) was observed between the age group and the requirement for hospitalization as a result of self-inflicted injuries.

Discussion

Suicide is a serious global health problem and the 2nd leading cause of death in children and adolescents. The rates of suicidal thoughts among the youth range from 19.8% to 24.0%, while suicide attempts are less frequent, ranging from 3.1% to 8.8%.² As far as Polish rates are concerned, 31% of young people aged from 14 to 21 years experienced suicidal ideation, while 8% have attempted suicide.¹⁸ Unfortunately, the trend change is not optimistic, with an increasing number of suicide cases^{12,19} and a decreasing age of children attempting suicide.²⁰ A 20-year analysis of suicide among Polish adolescents showed that suicide attempt rates were increasing, though there was a decrease in suicide-related deaths.²¹

The analysis of the data collected between January 2020 and June 2021 demonstrated a significant predominance of females among reported cases of suicide attempts (79.9%, $n = 123$). These findings are consistent with well-established knowledge that underage females are more likely than males to have suicidal thoughts and attempts.^{22,23} Indeed, a Polish study reported that 10.7% of females and 5.4% of males attempted suicide, giving a ratio of 2:1, while the suicidal ideation ratio was 1.5:1 (37.5% of females and 24.8% of males).²⁴ However, exceptions exist for Swedish males¹⁹ and very young children.²⁰ The increased suicidal tendency in females may be connected with a higher risk of depression.²⁵

The age of reported individuals ranged from 8 to 17 years, with 1 male and 1 female aged 8 attempting suicide through self-injury. Furthermore, almost half of the cases involved children aged between 8 and 13 years. Research on suicidal behaviors among very young children is insufficient, and little is known about the reasons for such behaviors. However, the frequency of suicidal thoughts and behaviors in preschoolers (children aged 3–6 years) is estimated to range from 4% to 13%.²⁶ Moreover, high family conflict and low parental supervision seem to be linked with suicidality in children aged 9 and 10.²⁰ Also, the increased use of social media at a young age and the rise in online bullying in recent years^{27,28} may have contributed to the increase in suicides and suicidal self-injury among young children.

Differences exist between the most common methods of suicide across countries. However, contrary to this study, a cross-European comparison of young people showed that the most frequent method of suicide attempt for both genders was hanging, while for males it was jumping from

height and using guns, and for female children it was poisoning by pharmaceuticals and jumping from height.²⁹ The current study showed that the most frequently chosen suicide method among both genders was poisoning (45.5%, $n = 70$), followed by suicidal self-injury (27.3%, $n = 42$). This may be because the consumption of prescribed pharmaceuticals³⁰ and dietary supplements³¹ is prevalent in Poland, with increasing abuse of over-the-counter medicines.³² The most common substances children ingested in suicidal attempts were acetaminophen and ibuprofen.³³ No case of a gun-related suicide was recorded, which may be due to Poland's restrictive gun laws. In addition, the study involved a highly urbanized area where keeping weapons in the household for purposes such as hunting is rare.

A link was observed between gender and the method of suicide attempt, with more females (50.9%, $n = 59$) than males (37.9%, $n = 11$) choosing poisoning, which has a relatively low fatality rate compared to other methods. Indeed, females are more likely to decide on intentional poisoning³⁴ due to their tendency to choose less lethal methods of suicide.³⁵ Additionally, the relationship between age and the method of suicide attempt demonstrated that older children, aged 14–17 years (61.8%), were more likely to choose poisoning, while younger children, aged 8–13 years (34.8%), mostly adopted suicidal self-injury. These findings are in line with other studies showing that suicide attempts due to poisoning are most often attempted by adolescents aged 14–18 years.³ However, data from the USA indicate that younger children aged 5–11 most frequently use hanging or suffocation, followed by using guns, which is contrary to the findings of this study.³⁶

Regarding the psychiatric aspect, a large number of children were under the care of a psychiatrist before attempting suicide (74.7%, $n = 115$), which is higher than prior reports showing that less than half of young people who attempted suicide had previously received psychiatric help.³⁷ At the same time, approx. 1/3 of the children had a history of mental disorders. The research of Gmitrowicz et al. showed that previous psychiatric treatment and psychotherapy was the most significant risk factor for a suicide attempt.¹⁸ Furthermore, Ong et al. demonstrated that depressive disorders among pediatric patients were associated with a higher likelihood of suicide than attention-deficit disorder, disruptive behavior disorder, bipolar disorder, and schizophrenia.³⁸

Addiction was noted in 16.2% ($n = 25$) of respondents, with the Internet/computer addiction, or a combination of both, being the most common. The link between substance abuse and suicidal behavior has been well documented,^{18,39} while little is known about the relationship between the Internet/computer addiction and suicide risk.⁴⁰ However, there is evidence that time spent using a computer and social media is harmful to children's mental health.^{28,40}

Recently, there has been a strong emphasis on distinguishing between non-suicidal self-injury (NSSI) and

suicide attempts.⁴¹ In the current study, almost 80% of children had self-mutilated before the suicide attempt, and NSSI is now believed to be a risk factor for suicide attempts in adolescents,^{42,43} as it increases the risk of future suicide attempts.⁴⁴

The COVID-19 pandemic disrupted the lives of people around the world. Furthermore, the mental health of young children and adolescents was affected by the social and psychological effects of the pandemic, which caused distress, and a rise in mental disorders and behavioral issues incidence.¹⁰ However, the impact of the pandemic on the number of suicides among children is unclear. Indeed, some studies demonstrated no relationship,⁴⁵ and others reached opposite conclusions.^{12,46} Nonetheless, the current study showed no statistically significant relationship between the SARS-CoV-2 pandemic and the suicide rate in Polish children and adolescents.

Limitations

Limitations of the study include the disparity between the number of males and females,²² though this imbalance may reflect the fact that females are much more likely to attempt suicide. Another constraint is the increased proportion of suicidal self-injuries recorded as suicide attempts, especially in children aged 8–13, which may be due to an overestimation resulting from an insufficient distinction between suicidal behavior and NSSI in Poland. Indeed, NSSI is often considered a suicide attempt, even though self-harm is generally nonlethal. In addition, no link existed between the COVID-19 pandemic and the suicide rate. However, this analysis may have been limited by relying on the psychiatric consultations and parental interviews mentioning the SARS-CoV-2 component. As such, determining the impact of the pandemic on mental health depended on subjective assessment, and healthcare professionals did not explicitly ask every child or caregiver about this element. Therefore, the results may be underestimated.

Conclusions


Suicide among children is a complex issue and a major public health concern, with the number of suicide attempts among pediatric patients steadily increasing. Children and adolescents attempt suicide under the influence of many factors, including mental disorders and addictions. Underage females are significantly more likely to mutilate themselves or attempt suicide. Meanwhile, age and gender impacted the suicide attempt frequency and methods used, with poisoning being the most common method used among examined pediatric patients. Fortunately, most patients attempting suicide had previous contact with a psychiatrist, although this did not prevent the suicide attempt.


The present research did not assess the impact of pandemic-related distress on suicidal behaviors among

the study group. Additional research is needed to evaluate the pattern and protective factors that may be associated with suicide hazards in the context of a global pandemic. It remains the responsibility of healthcare providers to be aware of the risk factors, changing patterns and management of suicide attempts among children.

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