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Originalarbeit

Gender Differences in Methods of Suicide Attempts and Prevalence of Previous Suicide Attempts

257 Adolescents Presenting to a General Hospital

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Abstract. *Objective:* Suicide attempts are important predictors of completed suicide. Adolescents admitted to the emergency room of a large university hospital in Bern after a suicide attempt during the years 2004–2010 were prospectively assessed for methods of suicide attempt. *Method:* Adolescents (N = 257; 66.5% female; age 14–21 years), presenting after a suicide attempt, were assessed with the WHO/EURO Multicentre Study on Parasuicide assessment tool. *Results:* Males more often used jumping from a high place (14% vs. 4.6% in females, $p < .05$) and less often intoxication (36% vs. 71.3%, $p < .01$). At least one previous suicide attempt was reported in 100 patients (44.4%; more females than males: Cramer-V = 0.21; $p = .002$). Of these, 35 adolescents did not present to this hospital or not at all for a previous suicide attempt. *Conclusions:* The present study is the first to examine methods of suicide attempts according to the ICD-10 X codes in this age group. Gender differences were observed. Because a relevant number of patients did not present to the same hospital or not at all for a previous suicide attempt, studies on pathways to care of adolescents after their first suicide attempt are important for early detection and intervention strategies.

Keywords: suicide, adolescence, youth, depression, self-mutilation

Zusammenfassung. *Suizidversuche bei 257 Adoleszenten – Geschlechtsunterschiede hinsichtlich Methoden und Suizidversuchen in der Vorgeschichte*

Fragestellung: Suizidversuche sind wichtige Prädiktoren eines vollendeten Suizids. Die Suizidversuche von Adoleszenten, die sich zwischen 2004 und 2010 einem großen Universitätskrankenhaus in Bern wegen eines Suizidversuchs präsentierten, wurden auf Geschlechtsunterschiede untersucht. *Methodik:* 257 Adoleszente (66.5 weiblich; 14–21 Jahre alt), die sich nach einem Suizidversuch in medizinische Behandlung begaben, wurden nach dem Vorgehen der "WHO/EURO Multicentre Study on Parasuicide" erfasst. *Ergebnisse:* Männliche Jugendliche sprangen häufiger von hohen Gebäuden (14.0% gegenüber 4.6% weiblichen Jugendlichen, $p < .05$) und nutzten seltener Intoxikationen (36.0% gegenüber 71.3%, $p < .01$). 100 Patienten (44.4%; mehr weibliche als männliche Jugendliche: Cramer-V = 0.21; $p = .002$) berichteten mindestens einen vorangegangenen Suizidversuch. 35 von diesen 100 Jugendlichen erschienen dafür nicht in diesem Krankenhaus oder überhaupt nicht. *Schlussfolgerungen:* Diese Studie ist die erste, die Methoden eines Suizidversuchs nach ICD-10 X Codes in dieser Altersgruppe untersucht. Geschlechtsunterschiede wurden beobachtet. Da eine relevante Anzahl Jugendlicher sich für einen vorangegangenen Suizidversuch nicht in diesem Krankenhaus oder überhaupt nicht vorstellten, sind Studien zu Behandlungspfaden nach einem ersten Suizidversuch in dieser Altersgruppe wichtig für die Entwicklung von Früherkennungs- und Behandlungsstrategien.

Schlüsselwörter: Suizidalität, Suizidversuch, Jugendalter, Depression, Selbstverletzung

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Introduction

Previous suicide attempts and suicidal behavior are the most important risk factors for completed suicide and are frequently associated with considerable mental health problems and adverse effects on psychosocial functioning (Brent, Baugher, Bridge, Chen, & Chiappetta, 1999; Bridge, Goldstein, & Brent, 2006; Pelkonen & Marttunen, 2003; Plener, Kapusta, Kölch, Kaess, & Brunner, 2012). Switzerland is a high-risk country for completed suicide with an incidence of 18/100,000 per year, which is higher than the incidence in Germany at 11.9/100,000 per year (Värnik, 2012). Generally, suicide attempts before adolescence are rare, but then suddenly rise in early adolescence (Cash & Bridge, 2009; Hawton, Saunders, & O'Connor, 2012). The prevalence of suicidal behavior in adolescents is high and in the BELLA study was estimated at 2.9% for suicide attempts and 3.8% for suicidal ideation in a German sample (Resch, Parzer, Brunner, & BELLA Study Group, 2008). Adolescent mental disorders and psychopathology contribute to a higher level of suicide risk (Bridge et al., 2006; Wunderlich, Bronisch, & Wittchen, 1998). Nevertheless, 40% of adolescents who attempt suicide do not appear to have any psychiatric disorder, highlighting the importance of other factors such as personality traits (e.g., perfectionism, impulsivity, neuroticism and aggression; Gunnell, Murray, & Hawton, 2000; Radeloff et al., 2012; Roy, 2002; Shaffer et al., 1996), or physical health (Arnold et al., 2005; Rey, Narring, Ferron, & Michaud, 1998).

Gender differences seem to play an important role in suicidal behavior in adolescence: Suicide attempts are more frequent in female than in male adolescents (Lewinsohn, Rohde, Seeley, & Baldwin, 2001). In contrast, completed suicide was two to four times more frequent in males than in females (Grunbaum et al., 2004), comprising 79% of completed suicides in the age group of 15–24-year-olds in a large European study (Värnik et al., 2009). This "gender paradox" may, among others things, be explained by the method of suicide attempt or completed suicide chosen by males and females. In a large study on completed suicide of adolescents, Lahti, Räsänen, Riala, Keränen, and Hakko (2011) reported that male adults chose more lethal suicide methods such as firearms (49%) and hanging (26%), while females rather chose intoxication (21%), which a suicidal person may be more likely to survive.

In the WHO/EURO Multicentre Study on Parasuicide of adults, a similar gender distribution of methods was found for suicide attempts, i.e., males chose more often cutting, hanging, jumping, and throwing themselves in front of a moving object, whereas women more often than males chose intoxication (Michel et al., 2000). To date, no data are available concerning the gender distribution of methods used in suicide attempts in adolescents.

Goldston et al. (1999) found a strong relationship between the history of suicidal behavior and future attempts. In adolescents (13–18 years old), the number of suicide attempts by females is greater than by males, but in young adulthood this gender difference diminishes. Also, a history of suicidal behavior (defined as previous suicidal ideation and/or suicide attempt) in adolescence was reported to be a strong predictor of suicide attempt in adulthood in females but not in males (Lewinsohn et al., 2001). Thus, the stability of suicidal behavior including suicide attempts may be higher in females than in males. This would be confirmed by data showing higher rates of previous suicide attempts in females presenting with a recent suicide attempt.

The present study is the first to examine gender differences in methods of suicide attempts according to ICD-10 classification (X-codes). Patients age 14–21 years who presented at the emergency room of a general university hospital after a suicide attempt were assessed. Based on the results of a previous study of adolescents (Lewinsohn et al., 2001), we expected more females than males to present after a suicide attempt. Furthermore, we hypothesized that (1) females would more often choose intoxication and males more often sharp and blunt objects, jumping, lying before moving objects and car accidents, and hanging; and (2) that female adolescents would more often have a history of previous suicide attempt.

Methods

Procedure and Sample

The WHO/EURO Multicentre Study on Parasuicide was continued in Bern applying the same methodology in adolescents (see Bille-Brahe et al., 1995; Michel et al., 2000). All adolescents (aged 14–21 years) presenting to the emergency room of the University of Bern's General Hospital between 2004 and 2010 following a suicide attempt received a standardized assessment of the method of suicide attempt. This large hospital treats more than 220,000 patients annually and has an on-site psychiatric service. Due to legal requirements in Switzerland, it is compulsory for the emergency department of any hospital to initiate a psychiatric evaluation in such cases. The study was approved by the university ethics committee and federal authorities. Only a few patients presenting after a suicide attempt were not assessed due to rapid referral to other hospitals or lack of time. Thus, the sample can be considered sufficiently representative of those adolescents presenting to this hospital after a suicide attempt. For the analysis, only the first suicide attempt presenting to this hospital was used to avoid bias by dependent data. Thus, each case represents one patient. 257 patients were included in the study.

Table 1
Methods of suicide attempts according to ICD-10 by sex (N = 257)

	Intoxication (X60–68)		Hanging (X70)		Sharp and blunt objects (X78–79)		Jumping from high places (X80)		Lying before moving objects (X81–82)		Other[a]	
	N	(%)	*N*	(%)	*N*	(%)	*N*	(%)	*N*	(%)	*N*	(%)
Total	153	(59.5)	15	(5.8)	57	(22.2)	20	(7.8)	9	(3.5)	3	(1.2)
Male	31	(36.0)	9	(10.4)	26	(30.2)	12	(14.0)	6	(7.0)	2	(2.3)
Female	122	(71.3)	6	(3.5)	31	(18.1)	8	(4.7)	3	(1.8)	1	(0.6)

Note. [a]other = Submersion (X71; 1 female), firearms and explosives (X72–75; 1 male), fire, flames and steam (X76–77; 1 male).

Assessments

Suicide attempt was defined according to ICD-10 (Michel et al., 2000). Only self-harming actions with suicidal intent were included, even if interrupted before severe self-harm had occurred. Conversely, acts of self-harm by people who did not understand the meaning or consequences of their own actions, thus without suicidal intent, were excluded (Schmidtke et al., 1996). Patients with a history of substance abuse or self-mutilation were included only if their act exceeded previously observed levels of self-harm and suicidal intent was reported.

Eight categories were constructed from the 25 ICD-10 X-codes according to the Guidelines of the WHO-Multicentre Study on Parasuicide (Schmidtke et al., 1996). All *intoxications with substances* (X60 to X69) were grouped together into the first category; attempted *hanging* (X70) constituted the second category; *submersion* (X71) the third; *firearms and explosives* (X72 to X75) the forth; *fire, flames and steam* (X76 to X77) the fifth; *sharp and blunt objects* (X78 and X79) the sixth; *jumping from a high place* (X80) the seventh; *lying before/in front of objects and car accident* (X81 and X82) the eighth. As *submersion*, *firearms, and explosives* as well as *fire*, *flames, and steam* were very uncommon (each $n = 1$), they were grouped together in one category (*"other"*)

Age, sex, methods of suicide attempts, and a history of previous suicidal attempts in the preceding 12 months were assessed with a standardized form (see Michel et al., 2000; Schmidtke et al., 1996). The psychiatric emergency staff had been trained in the assessment of methods of suicide.

Data Analysis

Data were presented in number of counts and percentages. Chi-square statistics (χ^2) were used to assess gender differences (6 × 2 table) with regard to method of suicide attempt. Posthoc examination of standardized residuals (z) was applied to determine which cells contributed to the overall significant group differences if appropriate (only p values are reported). Furthermore, gender difference of a history of previous suicide attempts (yes/no) was assessed using 2 × 2 χ^2 statistics. IBM SPSS Statistics Version 20.0 (IBM Corp., 2011) was used for statistical analyses.

Results

257 adolescents (66.5% female, age 18.75, *SD* 1.73; 33.5% male, mean age 19.03, *SD* 1.63) presented to the hospital after suicide attempts between 2004 and 2010. 199 (77.4%) were aged 18–21 years and 58 (22.6%) were age 14–17'11 years. Significantly more females than males presented after suicide attempts ($\chi^2 = 28.113$, $df = 1$, $p = .001$). The most common method was intoxication (59.5%) followed by usage of sharp and blunt objects (22.2%) in both males and females. Minors (age < 18) and older adolescents (age 18–21) did not differ with regard to methods of suicide attempt ($\chi^2 = 1.15$, $df = 1$, $p = .950$) and were therefore grouped together, when gender differences were considered.

Gender Distribution of Methods of Suicide Attempt

Table 1 displays the gender distribution of the method of suicide attempt. Males and females differed with regard to method of suicide attempt ($\chi^2 = 32.77$, $df = 5$, $p < .001$; Cramer-V = 0.36). Inspection of the standardized residuals indicated that males significantly less frequent used intoxication ($p < .01$) and significantly more frequent jumping from a high place ($p < .05$).

Previous Suicide Attempts

In 100 of the 225 suicide attempts (44.4%; $n = 32$ missings), at least one previous suicide attempt was reported, 20.4% ($n = 46$) within the preceding 12 months, 20.9% ($n = 47$) more than 12 months ago; in 3.1% ($n = 7$) the date of the previous suicide attempt was unknown. In 35 patients, the previous suicide attempt was clearly within the study period, for which the respective patient did not present to this hospital. Significantly more females ($n = 80$;

51.3%) than males (n = 20; 29.0%) reported a previous suicide attempt (χ^2 = 9.63, df = 1, p = .002; Cramer-V = 0.21) with no differences between minors (age < 18) and young adult adolescents (χ^2 = 0.01, df = 1, p = .942).

Discussion

To the authors' knowledge, the present study is the first to examine gender differences in methods of suicide attempts according to ICD-10 classification (X-codes) and thereby extends the findings in adults of the WHO/EURO Multicentre Study on Parasuicide (see Bille-Brahe et al., 1995; Michel et al., 2000).

In line with the observation by Lewinsohn et al. (2001) in the general population of adolescents, our sample of adolescents presenting to a general hospital after a suicide attempt consisted of about twice the number of females (66.5%) than males (33.5%). Our hypotheses, based on findings in adults, were confirmed that intoxication was less common and jumping from high places more common in males than in females. However, we did not detect any gender differences with regard to usage of sharp and blunt objects, lying before moving objects and car accidents, and hanging, which were more common in males in the WHO/EURO study in adults. One potential reason for the lack of gender differences in these methods is the rather small sample size of 257 patients. Therefore, the negative findings should be interpreted with caution in light of a potential type II error. A high number of adolescents (n = 100 out of 225, three quarter of them female) had previously committed a suicide attempt, almost half of them within the preceding 12 months. At least 35 adolescents (about one third of those who reported previous suicide attempts) did this within the study period and thus presented either to a different hospital or not at all. Since a suicide attempt is the best predictor of a future suicide attempt (Lewinsohn et al., 2001), future studies should focus on pathways to care after the first suicide attempt in adolescents in order to conceptualize early detection and intervention strategies.

This study has several limitations. Although the sample is considerably large, false negative findings (type II error) regarding gender differences cannot be excluded. Person-based results were considered, i.e., only the first event of a given person was counted. This was decided because gender distributions of methods of suicide attempts would have been augmented and thereby biased if events instead of person-based results had been analyzed, since repeaters tend to use the same method of parasuicide such as intoxication and cutting (Michel et al., 2000). Furthermore, because it cannot be excluded that some adolescents do not present to the hospital after a suicide attempt, particularly if the suicidal intention was not reported or observed by the guardians and/or the suicide attempt was not perceived severe enough, the findings regarding gender distributions cannot be generalized to the general population.

Conclusions

Despite the limitations of this study it seems that suicide attempts that come to the attention of a huge general hospital are more common in females than in males, with males using more often jumping from a high place and less often intoxication as their method of suicide attempt. A high number of patients (three quarters of those are female) reported a previous suicide attempt, with a significant number thereof (at least n = 35 in our study) not presenting to the same hospital or not at all. Therefore, it is important to study pathways to care for adolescents after their first suicide attempt in order to plan early detection and intervention strategies, which are highly important, because a previous suicide attempt is one of the best predictors of future suicide attempts and completed suicide.

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References

Arnold, E. M., Goldston, D. B., Walsh, A. K., Reboussin, B. A., Daniel, S. S., Hickman, E., & Wood, F. B. (2005). Severity of emotional and behavioral problems among poor and typical readers. *Journal of Abnormal Child Psychology, 33,* 205–217.

Bille-Brahe, U., Schmidtke, A., Kerkhof, A. J., De Leo, D., Lönnqvist, J., Platt, S., & Sampaio Faria, J. (1995). Background and introduction to the WHO/EURO Multicentre Study on Parasuicide. *Crisis, 16*, 72–78.

Brent, D. A., Baugher, M., Bridge, J., Chen, T., & Chiappetta, L. (1999). Age- and sex-related risk factors for adolescent suicide. *Journal of the American Academy of Child and Adolescent Psychiatry, 38,* 1497–1505.

Bridge, J. A., Goldstein, T. R., & Brent, D. A. (2006). Adolescent suicide and suicidal behavior. *Journal of Child Psychology and Psychiatry, 47,* 372–394.

Cash, S. J., & Bridge, J. A. (2009). Epidemiology of youth suicide and suicidal behavior. *Current Opinion in Pediatrics, 21*, 613–619.

Goldston, D. B., Daniel, S. S., Reboussin, D. M., Reboussin, B. A., Frazier, P. H., & Kelley, A. E. (1999). Suicide attempts among formerly hospitalized adolescents: A prospective naturalistic study of risk during the first 5 years after discharge. *Journal of the American Academy of Child and Adolescent Psychiatry, 38,* 660–671.

Grunbaum, J. A., Kann, L., Kinchen, S., Ross, J., Hawkins, J., Lowry, R., . . . Collins, J. (2004). Youth risk behavior surveillance – United States, 2003. *Journal of School Health, 74,* 307–324.

Gunnell, D., Murray, V., & Hawton, K. (2000). Use of paracetamol (acetaminophen) for suicide and nonfatal poisoning: Worldwide patterns of use and misuse. *Suicide and Life-Threatening Behavior, 30,* 313–326.

Hawton, K., Saunders, K. E., & O'Connor, R. C. (2012). Self-harm and suicide in adolescents. *Lancet, 379,* 2373–2382.

Lahti, A., Räsänen, P., Riala, K., Keränen, S., & Hakko, H. (2011). Youth suicide trends in Finland, 1969–2008. *Journal of Child Psychology and Psychiatry, 52,* 984–991.

Lewinsohn, P. M., Rohde, P., Seeley, J. R., & Baldwin, C. L. (2001). Gender differences in suicide attempts from adolescence to young adulthood. *Journal of the American Academy of Child and Adolescent Psychiatry, 40,* 427–434.

Michel, K., Ballinari, P., Bille-Brahe, U., Bjerke, T., Crepet, P., De Leo, D., . . . Wasserman, D. (2000). Methods used for parasuicide: Results of the WHO/EURO Multicentre Study on Parasuicide. *Social Psychiatry and Psychiatric Epidemiology, 35,* 156–163.

Pelkonen, M., & Marttunen, M. (2003). Child and adolescent suicide: Epidemiology, risk factors, and approaches to prevention. *Pediatric Drugs, 5*, 243–265.

Plener, P. L., Kapusta, N. D., Kölch, M. G., Kaess, M., & Brunner, R. (2012). Nicht-suizidale Selbstverletzung als eigenständige Diagnose [Nonsuicidal self-injury as autonomous diagnosis]. *Zeitschrift für Kinder- und Jugendpsychiatrie und Psychotherapie, 40,* 113–120.

Radeloff, D., Lempp, T., Albowitz, M., Oddo, S., Toennes, S. W., Schmidt, P. H., . . . Kettner, M. (2012). Suizide im Kindes- und Jugendalter [Suicide in children and adolescents]. *Zeitschrift für Kinder- und Jugendpsychiatrie und Psychotherapie, 40,* 263–269.

Resch, F., Parzer, P., Brunner, R., & BELLA study group (2008). Self-mutilation and suicidal behavior in children and adolescents: Prevalence and psychosocial correlates: Results of the BELLA study. *European Child and Adolescent Psychiatry, 17*(Suppl. 1), 92–98.

Rey, G. C., Narring, F., Ferron, C., & Michaud, P. A. (1998). Suicide attempts among adolescents in Switzerland: Prevalence, associated factors and comorbidity. *Acta Psychiatrica Scandinavica, 98,* 28–33.

Roy, A. (2002). Family history of suicide and neuroticism: A preliminary study. *Psychiatry Research, 110,* 87–90.

Schmidtke, A., Bille-Brahe, U., DeLeo, D., Kerkhof, A., Bjerke, T., Crepet, P., . . . Sampaio-Faria, J. G. (1996). Suicide attempt in Europe: Rates, trends and sociodemographic characteristics of suicide attempters during the period 1989–1992. Results of the WHO/EURO Multicentre Study on Parasuicide. *Acta Psychiatrica Scandinavica, 93,* 327–338.

Shaffer, D., Gould, M. S., Fisher, P., Trautman, P., Moreau, D., Kleinman, M., & Flory M. 1996). Psychiatric diagnosis in child and adolescent suicide. *Archives of General Psychiatry, 53,* 339–348.

Värnik, A., Kolves, K., Allik, J., Arensman, E., Aromaa, E., van Audenhove, C., . . . Hegerl, U. (2009). Gender issues in suicide rates, trends and methods among youths aged 15–24 in 15 European countries. *Journal of Affective Disorders, 113,* 216–226.

Värnik, P. (2012). Suicide in the world. *International Journal of Environmental Research and Public Health, 9,* 760–771.

Wunderlich, U., Bronisch, T., & Wittchen, H. U. (1998). Comorbidity patterns in adolescents and young adults with suicide attempts. *European Archives of Psychiatry and Clinical Neuroscience, 248,* 87–95.

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