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Stability in the choice of method during the period preceding a suicide attempt and in attempt repeaters

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ABSTRACT – Background and Objectives: Understanding the mental processes preceding a suicidal act is important for the potential to intervene. This study investigates stability and possible changes of suicide methods considered during the time immediately preceding a suicide attempt.

Methods: Patients who had attempted suicide were interviewed shortly thereafter with regard to whether there was a change in the conception of the method to be used during the period preceding the attempt. In addition, the course of methods applied in previous suicide attempts was assessed in attempt repeaters.

Results: In total, 130 patients were included. In 63.1% one method only was envisaged during the entire suicidal crisis, in 26.9% the initial and the actual method differed. Stability rate was higher in those older than 40 years, if the duration of the suicidal crisis was ≤ 60 minutes and if a non-violent suicide method was initially intended. Of repeaters, 46.5% used the same method in all recorded attempts. Use of a non-violent method in the first suicide attempt predicted method stability in subsequent attempts.

Conclusions: Focusing on one single suicide method during the time immediately preceding a suicide attempt is common. Reduced flexibility to rapidly switch mentally to another method may contribute to explain the effectiveness of limiting access to suicide means for suicide prevention.

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Introduction

A history of attempted suicide, notably repeated suicidal behavior, is a major risk factor for completed suicide as well as for further suicide attempts¹⁻³. Although the acute processes leading to nonfatal suicidal behavior or completed suicide may not be completely congruent, the former is generally seen as an approximate model for the latter.

However, the factors involved in the emergence of a suicidal crisis and the psychological and cognitive processes preceding a suicidal act are still poorly understood. Accumulating evidence points towards a significant role of executive functions such as cognitive flexibility and decision making which seem to be impaired in suicidal individuals⁴⁻⁶. Such alterations can, however, hardly be tested reliably in the situation immediately before a suicidal act and thus most studies on cognitive impairments are based on trait assessments⁷.

Generally, reduced cognitive flexibility is seen as a factor possibly increasing the risk for the realization of suicidal plans. More specifically, it may impair the ability to find or use an alternative way out of a crisis subjectively perceived as unbearable by focusing on the solution of ending one's life only. Problem solving strategies available under normal circumstances may not be accessible in this specific state of mind.

The choice of method for a suicidal act is determined by a number of factors. Availability generally plays a major role. Biddle *et al*⁸ found in a qualitative interview study in suicide attempt survivors that in those who adopted or contemplated hanging as suicide method it was anticipated as certain and easily accessible while those who rejected this method recognized it as painful and "messy". Use of chemical agents and falling are more common in unplanned than planned suicide

attempters⁹. Available information on new methods, especially from the internet, may foster the emergence of these¹⁰. Method choice may vary between different suicide attempts. However, concerning changes in method consideration while going through the decision phase preceding a suicide attempt knowledge is widely lacking.

On the other hand, there is increasing evidence that reducing the availability of a suicide method has a lowering effect on general suicide rates¹¹⁻¹³. These findings have led to the inclusion of limiting access to suicide means into most suicide prevention programs¹⁴⁻¹⁶. It appears that at least not all suicidal individuals hindered to use a specific, highly lethal method such as, e.g., jumping or shooting switch to another site or method available within the phase of acute suicidality. Potentially, impaired mental flexibility during the suicidal crisis not only refers to the decision to end the life as such but also to the choice of suicide method.

This study aimed to shed further light on the mental processes immediately preceding a suicidal act. In particular, changes in which suicide methods are envisaged during the suicidal crisis were studied in patients having survived a suicide attempt. Demographic and clinical factors which may have an influence on cognitive processes during the pre-attempt period (e.g., age, gender, suicidal intent, diagnosis, course of illness) were studied within a regression analysis. We hypothesized that there would be no fluctuation in method consideration in the majority of suicide attempters and that this stability of method would be only marginally affected by demographic and clinical factors.

In addition, the long-term stability of suicide methods applied over the course of multiple attempts was studied in those participants who were suicide attempt repeaters.

Methods

Participants and clinical assessment

Male and female patients who were admitted to the Department of Psychiatry of the Medical University of Innsbruck for in-patient treatment after a suicide attempt and were able to comply with the study procedure (in terms of competence to communicate in German and cognitive capacity) were approached on the ward and invited for study participation. A semi-structured interview was conducted concerning the circumstances of the current suicide attempt with a specific focus on whether the patient had considered just one single method for the suicidal act during the entire suicidal crisis (defined as the period from the first current thought of ending one's life until the actual act) or if more than one method was envisaged.

The list of demographic and clinical data assessed included the history of prior suicide attempts with the respective methods used. In those patients who had previously attempted suicide (i.e., attempt repeaters) methods used in these attempts were assessed. Of the suicide attempt history, up to three prior attempts, thus totally four attempts, were analyzed. The number of prior attempts was limited to three in order to avoid potential recall bias effects for those attempts dating back too long.

Concerning the degree of violence of suicide methods, intoxication and drowning were considered as non-violent while all other methods were regarded as violent. The differentiation between violent and non-violent methods was made with regard to the potential to interrupt the suicidal act before an actual physical damage has occurred.

The Suicidal Intent Scale (SIS; 17) was used for the current attempt. The SIS has been

designed to measure the severity of a suicide attempt and is applied in attempters after the suicidal act. It consists of 15 items grouped into the subscales "circumstances related to suicide attempt" and "self report". The total SIS score may range between 0 and 30, higher scores signifying higher suicidal intent.

The study procedure was approved by the Ethics Committee of the Medical University of Innsbruck.

Data analysis

All statistical analyses were performed using SPSS, version 20. Apart from descriptive statistics (frequencies, mean, standard deviation, etc.) the following inferential statistical methods were applied. The sign test was used to compare the proportion of patients with an increase in violence to those with a decrease in violence regarding the suicide methods used or envisaged.

Factors affecting the stability of the suicide method during the current suicidal process (coded as identical vs. not identical/fluctuating) as well as during the course of repeated suicide attempts (identical vs. not identical) were investigated by Chi-square test or Fisher's exact test depending on the variable type (categorical variables with ≥ 3 levels or dichotomous/dichotomized variables, respectively). Moreover, multiple logistic regression with forward stepwise variable selection was employed to analyze the joint effect of several variables on the stability of the suicide method. Only variables which had yielded a p-value < 0.1 in the univariate analysis were included in the latter analysis. Potential predictors considered were age, gender, education, partnership, family history of (attempted) suicide, diagnosis, duration of illness, former hospitalizations, and SIS score.

Potential predictors of changes in violence of the envisaged methods during the suicidal process or during the course of attempted suicides (+1 = increase, -1 = decrease, 0 = neither increase nor decrease in violence) were investigated by means of ordinal regression. First univariate ordinal regression analyses were performed, followed by multiple ordinal regression analysis of all variables that had given rise to a p -value < 0.1 in the univariate analysis. Again the forward stepwise variable selection method was used. All statistical tests were performed at a 5% level of significance.

Results

Patient characteristics and details on current suicide attempt

A total of 130 patients who had been admitted for inpatient treatment after a suicide attempt were included. Study participants were recruited from July 2004 to December 2005 and from February to September 2008. Demographic variables are displayed in Table 1. Briefly, nearly two thirds of the sample were female, mean age was 39.1 years (range, 18-84). Nearly half of patients were single and 50% were currently living in a partnership. The most prevalent diagnosis was an affective disorder (41.5%) and two thirds had previously been hospitalized.

Details on the current suicide attempt and the history of prior suicide attempts are shown in Table 2. The mean duration between suicide attempt and study assessment was 4.3 days, 44.6% reported a duration of the acute suicidal crisis of up to 60 minutes. The most prevalent suicide methods were drug ingestion in 66.9% and cutting in 20.8%.

Figure 1 shows the changes in suicide methods envisaged by the patients during the current suicidal crisis. 63.1% reported to have

considered one single method during the entire process, an additional 9.2% applied the suicide method initially envisaged although they had thought of other methods during the time preceding the attempt. In 26.9% the method which was eventually applied differed from that envisaged at the beginning of the suicidal crisis.

In the majority of cases (77.7%) the considered suicide methods remained in the same category of violence. An increase in method violence (e.g., from drug ingestion to cutting) was noted in 9.2% and a decrease in 12.3%. (no significant difference between increase and decrease, sign test; data of one patient missing because she was in retrospect uncertain about a change in method choice).

Factors affecting stability of method and change in violence of method during the current suicidal process

A summary of the factors affecting the stability of the envisaged suicide method during the current suicidal process is given in Table 3. Among socio-demographic patient characteristics, only age showed a significant effect on stability of method: 78.6% of patients aged over 40, but only 52.1% of those up to 40 years maintained the same suicide method from the beginning of the suicidal process until the realization of the act. Two further variables significantly impacted on the stability of the method, namely duration of the suicidal process (with durations of 60 minutes or less giving rise to higher stability) and violence of the originally planned method (higher stability in patients who initially intended to use a non-violent suicide method). A trend level effect was observed for the SIS score. Patients with lower suicidal intent (SIS score ≤ 15) showed more stability of methods than those with higher intent.

Table 1
Patient characteristics

Gender	
Male	47 (36.2%)
Female	83 (63.8%)
Age, mean (\pm SD)	
	39.1 (\pm 14.1)
Marital status	
Single	62 (47.7%)
Married or cohabiting	37 (28.5%)
Divorced	28 (21.5%)
Widowed	3 (2.3%)
Current partnership	
	65 (50%)
Household situation	
Alone	51 (39.2%)
With partner	41 (31.5%)
With children	11 (8.5%)
Family of origin	13 (10%)
Other	14 (10.7%)
Working status	
Employed	49 (37.7%)
Unemployed	20 (15.4%)
Retired	32 (24.6%)
Other	29 (22.3%)
Smokers	
	90 (69.2%)
Diagnosis (ICD-10)	
F1 (Psychoactive substance use)	19 (14.6%)
F2 (Schizophrenia)	10 (7.7%)
F3 (Affective disorders)	54 (41.5%)
F4 (Adjustment disorders)	23 (17.7%)
F5 (Eating disorders)	3 (2.3%)
F6 (Personality disorders)	21 (16.2%)
N° of prior admissions	
0	44 (33.8%)
1	26 (20%)
2-3	18 (13.8%)
4-10	20 (15.4%)
11+	22 (16.9%)
Family history for completed suicide	
	26 (20%)
Family history for suicide attempts	
	42 (32.2%)

Table 2
Current suicide attempt and suicide attempt history

Days between suicide attempt and assessment, mean (\pm SD)	4.3 (\pm 5.3)
Duration of the suicidal process	
≤ 10 min	52 (40%)
10-60 min	6 (4.6%)
1-24 hours	16 (12.3%)
≥ 1 day	56 (43%)
Method of current attempt	
Drug ingestion	87 (66.9%)
Cutting	27 (20.8%)
Hanging	6 (4.6%)
Other	10 (7.8%)
Violent method	39 (30%)
Non-violent method	91 (70%)
SIS score, mean (\pm SD)	14.8 (\pm 5.2)
History of previous suicide attempts (repeaters)	86 (66.2%)
Number of previous suicide attempts, mean (\pm SD)	3.7 (\pm 7.4)

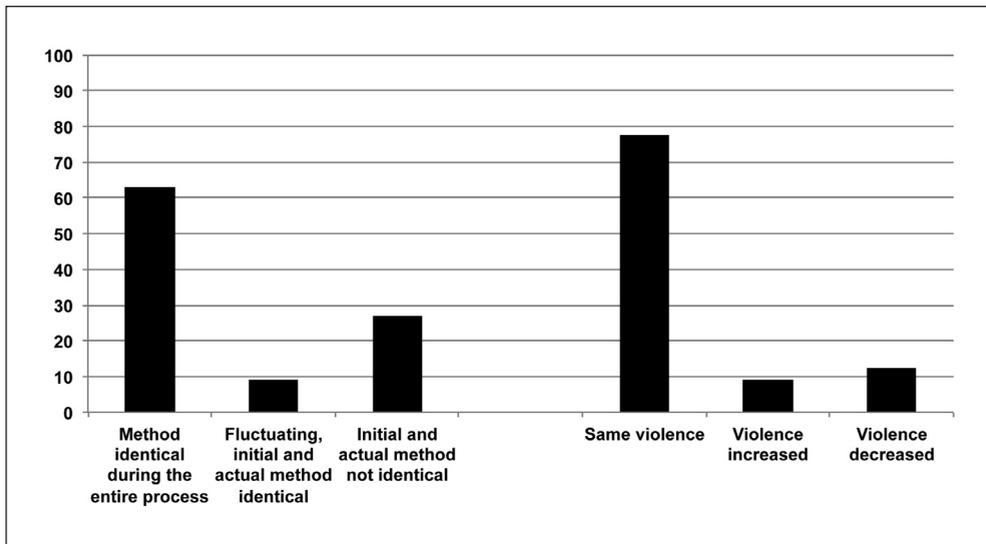


Figure 1. Stability of method and method violence during current suicidal process.

When combining these variables in a logistic regression analysis, all of the above predictors except SIS score stayed significant (see last column of Table 3). When considering age as a continuous variable the significance level of age was slightly reduced ($p = 0.031$) whereas the results for the other predictors remained virtually unchanged (almost identical p -values).

With regard to the predictors of change in violence of the envisaged suicide method during the suicidal process, the univariate analysis revealed three significant factors, namely age, employment status and SIS score (Table 4). Younger patients ($\text{age} \leq 40$) showed a significantly stronger decrease in method violence than older ones ($\text{age} > 40$). A significantly larger decrease in method violence was also seen in employed patients compared to unemployed/retired subjects. Finally, patients with a higher SIS score (≥ 16) showed a significantly larger decrease in violence than patients with lower suicidal intent.

When combining the three predictors in an ordinal regression analysis, only the effect of age and SIS score remained significant (see last column of Table 4). Results remained almost unchanged when using age as a continuous variable.

Factors affecting stability of method and change in violence of the suicide method during the course of suicide attempts in repeaters

A total of 86 patients (66.2%) had a history of previous suicide attempts. Figure 2 displays the variation in suicide methods and violence of the suicide method in these repeaters. Of these, 40 (46.5%) used the same method in all their recorded suicide attempts. Violence status of the method changed from

violent to non-violent twice as often than from non-violent to violent (23.3% vs. 11.6%). Here, only a trend-level significance was reached ($p = 0.072$, sign test).

Regarding stability of suicide methods during the course of repeated suicide attempts, only one significant predictor was found, namely violence of method used in the first recorded suicide attempt. Patients who used a non-violent method in their first suicide attempt significantly more frequently showed stability of suicide methods than those with a violent method (65.4% vs. 18.2%, $p < 0.001$, Fisher's exact test).

Concerning change in violence of methods used during the course of suicide attempts, again only violence of method used in the first suicide attempt was found as a significant predictor ($\text{beta} = -19.9$, $p < 0.001$). Twenty-one (63.6%) of the 33 patients with a violent first suicide attempt showed a decrease in violence of method during the course of suicide attempts while 10 (19.2%) of the 52 patients with a non-violent first attempt presented with an increase in violence.

Discussion

In this study we found that nearly two thirds of patients having recently attempted suicide remained on one suicide method during the entire suicidal crisis and eventually applied the same method which they had envisaged at the beginning of the suicidal process. This was particularly true if attempters were older, if the duration of the suicidal crisis was shorter and if a non-violent method had been envisaged initially. Concerning the violence of suicide methods a change was even less common.

In the subgroup of suicide attempt repeaters nearly half of patients used the same

Table 3
Predictors of stability of method during the suicidal process

Predictor*	% Patients showing stability of method within suicidal process		Statistics	
	Subgroup 1	Subgroup 2	Odds ratio	p univariate [§] p logistic regression [%]
Age (years)	≤40 vs. >40	78.6% (44/56)	0.296	0.003 0.007
Duration of suicidal process (min.)	≤60 vs. >60	50.0% (36/72)	4.184	<0.001 0.002
SIS score	≤15 vs. >15	55.6% (35/63)	1.980	0.071 n.s.
Violence of originally envisaged method	violent vs. non-violent	73.9% (65/88)	0.251	<0.001 0.004

* Only significant or nearly significant predictors (p<0.1 in the univariate analysis) are shown. Further variables tested were gender, education, stable partnership (y/n), family history of suicide/attempted suicide, diagnosis, duration of illness, and former hospitalizations. None of these variables showed a significant relationship with stability of method.

§ Fisher's exact test.

% Multiple logistic regression analysis.

Table 4

Predictors of change in violence of envisaged method during the suicidal process

Predictor*	Subgroups 1 vs. 2	% Patients showing a decrease (Decr) or increase (Incr) in violence		Statistics	
		Subgroup 1	Subgroup 2	Beta	p univariate [§] p ordinal regression [%]
Age (years)	≤40 vs. >40	Decr: 19.2% (13/73) Incr: 8.2% (6/73)	Decr: 3.6% (2/56) Incr: 10.7% (6/56)	-0.999	0.031 0.033
Employment	Yes vs. No	Decr: 18.6% (11/59) Incr: 6.8% (4/59)	Decr: 7.1% (5/70) Incr: 11.4% (8/70)	-0.877	0.046 n.s.
SIS score	≤15 vs. ≥16	Decr: 6.1% (4/66) Incr: 12.1% (8/66)	Decr: 17.5% (11/63) Incr: 11.4% (4/63)	.972	0.034 0.028

* Only significant or nearly significant predictors (p<0.1 in the univariate analysis) are shown. Further variables tested were gender, education, stable partnership (y/n), family history of (attempted) suicide, diagnosis, duration of illness, former admissions, and duration of suicidal process. None of these variables showed a significant relationship with change in violence.

§ Univariate ordinal regression analysis.

% Multiple ordinal regression analysis.

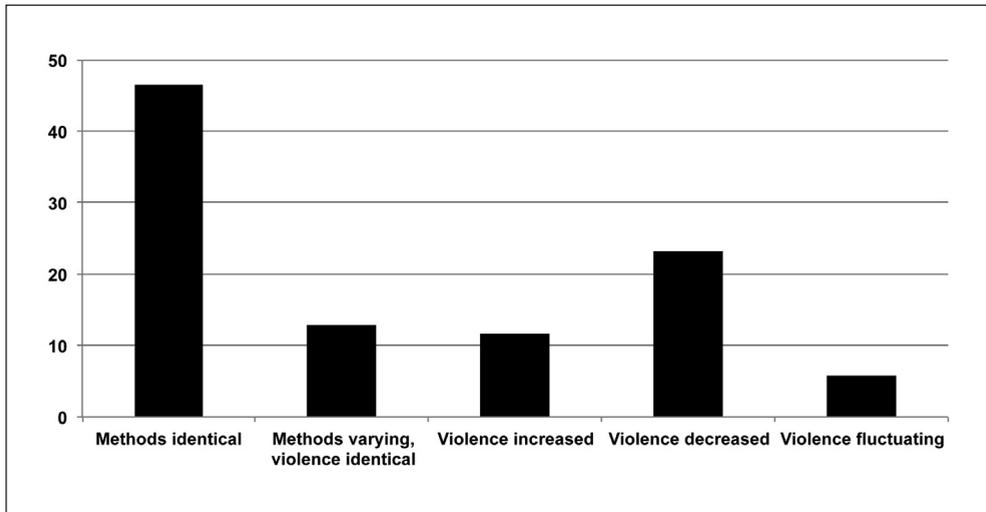


Figure 2. Stability of method and method violence in repeated suicide attempts.

method in all assessed attempts and in additional 13% the degree of method violence remained the same. Violence of method used tended to decrease rather than to increase during the course of suicide attempts. Choice of a non-violent method in the first recorded attempt predicted stability in suicide methods used in subsequent attempts.

Suicide methods envisaged during the current suicidal crisis

The high degree of stability of the suicide method patients envisaged throughout the suicidal crisis may reflect a reduced potential to plan the suicidal act in a way that maintains the possibility to adapt one's actions to changing circumstances. Rather, the choice of method may in many cases be already an implicit part of the plan to end one's life. This is in concordance with reports of patients who survived a suicide attempt which suggest that in many cases the course of the suicidal process is not a stepwise decision in terms of "I want to kill myself – which means are available for

me?" but "I will shoot myself!" or "I will jump from (a specific) bridge/building!".

This may explain why the limitation of access to specific suicide means can lead to a reduction of suicides with the respective method or at a specific site without substitution with other methods or sites. In a number of studies investigating the consequences of access restriction such a beneficial effect was found¹⁸⁻²⁰. At least not all individuals intending to end their lives are able to cognitively shift to another method when they are confronted with a barrier or another deterring measure at a railway platform, a high building or a bridge. A study investigating the effects of the restriction of firearm availability due to an army reform in Switzerland found a decrease in firearm as well as general suicide rates in the affected population and estimated that only 22% of the prevented firearm suicides were substituted by suicides with other methods²¹.

It has been suggested that availability of suicide means is an important factor for the choice of a specific method²²⁻²⁴. It should be

amended that suicides occur (and, likewise, a suicide method is chosen) as a consequence of additional, individual-specific circumstances which only make a suicidal act feasible. Affective and emotional impulses may have an influence as well as the cognitive capability to convert suicidal ideation into an act and the way and method how it is conducted.

In this study, suicide attempters aged over 40 years showed a higher degree of stability in the choice of suicide method than younger patients. Although there were too few individuals from higher age groups in which clinically relevant cognitive deficits become more likely, this finding points to the potential influence of age on the ability to change behavioral strategies, e.g., via less impulsiveness. Elder patients may have arranged the attempt more thoroughly what would be supported by the higher SIS scores found with increasing age.

In a prior study²⁵ we found that in a considerable portion of suicide attempters (47.6%) the acute suicidal crisis lasted very short (10 minutes or less). Those in which the suicidal process had taken longer had higher suicidal intent scores. In the present investigation in an enlarged sample this rate was similarly high (40%). Once the acute suicidal process has started, many patients seem to act fast and with a form of tunnel vision. This emphasizes the need to reduce the access to at least the more lethal suicide means in this oftentimes short phase. Another approach could be to use the information sources which are generally available to inform choice of suicide method in the forefront of a suicidal crisis such as television or the internet for prevention strategies, specifically by generating negative images of particularly dangerous methods²⁶.

It is not surprising that a shorter duration of the suicidal crisis was associated with more method stability. The finding that patients who initially intended to use a non-violent suicide method also showed more stability might be explained by the presumably higher availability. Most participants had already been in medical treatment before the suicide attempt and may have had prescribed drugs on hand. Violent methods initially envisaged by attempters included jumping in front of a train or from a height and intravenous drug application which, however, were not available at the time of the actual completion of the attempt.

Two variables predicted a change in violence of the envisaged suicide method during the suicidal process. Patients older than 40 years less often showed a decrease in method violence what may be related to a generally higher degree of determinedness in this age group when the decision to end one's life has been made. On the other hand, those with higher SIS scores more often reported a decrease in method violence (in the limited number of cases where method stability was not sustained). SIS items refer to different time points of the suicidal process: more distant (e.g., "final acts in anticipation of death"), closer to the attempt (e.g., "ambivalence toward living") or even after the attempt (e.g., "acting to gain help during/after attempt"). It may well be that individuals who initially were determined to die developed a more life oriented view during the suicidal crisis and turned to a less violent method what eventually left them as "just" suicide attempters. However, these at the beginning of the process presumably high risk individuals may have more overlapping with suicide completers.

Suicide methods in attempt repeaters

In a British multi-centre study 67% of repeaters used the same category of methods in subsequent self-harm episodes (27). This percentage is even higher than the 46.5% choosing the same method we found. However, in our study suicide methods were analyzed separately, not in categories.

The finding that using a non-violent suicide method in the first recorded attempt predicted method continuity in subsequent attempts is in line with the study of Huang *et al.*²⁸. Potentially a significant number of suicide attempters can manage to stabilize themselves by acting out auto-aggressive impulses in a less dangerous way and do not need to progress to completed suicide. Obviously, there is no general escalation in lethality of methods in suicide attempt repeaters.

Most studies which investigated the course of method choice in repeaters of suicidal acts reported diverging methods in suicide attempts and subsequent suicide^{29,30}. Switching to a more lethal method and escalating severity of self-poisoning seem to be predictors for completed suicide^{31,32}. Several studies found associations between particular methods used in suicide attempts and subsequent risk of suicide or attempt repetition³³⁻³⁷ although others did not³⁸ and Owens *et al.* recently cautioned against “false assumptions about people’s risks or needs based simply on the method of harm”³⁹.

Limitations

The main but almost insolvable limitation of the study is that information on which suicide methods were envisaged during the sui-

cidal crisis could be obtained only from those patients who survived the attempt. We can only speculate on the mental processes in suicide completers and neither suicide note research nor studies using the psychological autopsy method will allow us authentic insight into the actual last thoughts of an individual who died from suicide. Further, the reliability of answers of suicide attempt survivors may have been biased. In the oftentimes extraordinary circumstances after the subjectively perceived failure of not having died after one has attempted to take the own life, reports are generally emotionally biased and may be subject to manifold mental processing mechanisms. However, consenting to participate in a research project in such a situation may well reflect a sufficient willingness to give valid and reliable answers.

Conclusion

In summary, the results of this study suggest that in many suicide attempters considering various suicide methods before carrying out the act is uncommon. Whether this is due to a situational cognitive restriction or the consequence of increased cognitive rigidity as a trait of suicidal individuals or associated with the conviction that the envisaged method will actually result in death remains to be elucidated. However, the findings may be helpful in the explanation of the reported effectiveness of limiting the availability of suicide means for suicide prevention. Further research on which factors affect the course and outcome of a suicidal crisis and how this process may be influenced is urgently needed and remains an important issue for suicide prevention.

Conflict of interest

None.

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