Acta Biomed 2024; Vol. 95, N. 4: e2024055 DOI: 10.23750/abm.v95i4.15309

Original article

How socioprofessional factors effect serious suicide attempts: A case–control study

Stéphane Saillant[1], José Paz[2], Philippe Golay[3], Louise Ostertag[4], Alessandra Costanza[5], Bénédicte Van der Vaeren[6], Yves Dorogi[4], Irina Guseva-Canu[2,], Laurent Michaud[4,*]*

[1]Department of General and Liaison Psychiatry, Neuchatel Psychiatric Center, Switzerland; [2]Center for Primary Care and Public Health (Unisanté), University of Lausanne, Switzerland; [3]Community Psychiatry Service, Department of Psychiatry, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland; [4]Liaison Psychiatry Service, Department of Psychiatry, Lausanne University Hospital and University of Lausanne, Lausanne, Switzerland; [5]Department of Psychiatry, Faculty of Medicine, University of Geneva (UNIGE), Geneva, Switzerland; [6]Pole of Psychiatry and Psychotherapy, Liaison Psychiatry Service, Hospital Centre of Valais, Romand, Switzerland; [*]these authors contributed equally to this work

Abstract. *Background and aims:* A serious suicide attempt (SSA) is defined as a suicidal act that requires subsequent hospitalization for more than 24 hours. As some occupations have been identified as being at an increased risk of suicide, we hypothesized that certain socioprofessional factors act as risk factors for SSAs. To test this hypothesis, we assessed whether occupational status, learned or current occupation, the skill level required for that occupation, and socioeconomic status differed between people who had made an SSA (*i.e.*, cases) and those who had made a non-serious suicide attempt (*i.e.*, controls). *Research design and methods:* We used data from a self-harm monitoring program in the French-speaking regions of Switzerland. Associations between SSAs and socioprofessional factors were assessed using univariate and multivariable logistic regression models. *Results:* The study sample comprised 320 cases and 1468 controls. Data on recent interruptions to employment, suffering at work, and the highest level of education reached differed significantly between the cases and controls. Differences in occupational status were of borderline statistical significance. The proportion of active employees was higher among controls than among cases, but data on cases' occupation and education were more often unknown. High levels of professional skills and being employed in the physical, mathematical, and engineering sciences were associated with SSAs. Among these, architects, engineers, and related professionals were the most at risk in the univariate model, although multivariate analyses failed to confirm this. *Conclusion:* Findings suggested that some occupational variables were associated with a higher probability of SSAs. However, there were lots of missing values among the predictor variables. These issues could be remediated by improving training for team members involved in data collection and paying greater attention to the socioprofessional factors affecting suicidal behavior. (www.actabiomedica.it)

Key words: suicide prevention, suicide attempt, serious suicide attempt, socioprofessional factors, high skill level

Introduction

Suicide is a major mental health problem, causing the deaths of many people around the world each year (1, 2). In Switzerland, approximately 1,000 people die by suicide every year, four times more than those due to car accidents, and the suicide rate is 11.0 per 100,000 inhabitants (3). A previous suicide attempt (SA) is the strongest risk factor for subsequent death by suicide (4).

Among SAs, it is useful to study failed serious suicide attempts (SSAs) specifically since they seem to be an important proxy for later death by suicide: people engaging in an SSA and people dying by suicide share similar psychosocial and neurobiological characteristics (5-9), and SSAs have been associated with an increased risk of later dying by suicide (8-12). An SSA is a suicidal act that requires subsequent hospitalization for more than 24 hours and management in a specialized unit (6, 13, 14).

The following elements have been associated with SSAs: psychiatric illnesses and psychological problems (11, 13, 14); hopelessness, age, male sex, repeated SAs, psychomotor agitation, and severity of suicidal ideation (SI) (5); low self-esteem and interpersonal communication difficulties (14, 15); mental pain and its interaction with interpersonal difficulties (14); decision-making impairments (16-18); interactions between tendencies to aggression, impulsion or anger and substance misuse that can create a vicious circle (19, 20); and negative life events, particularly histories of sexual or physical abuse in anamnesis (13, 21, 22). These studies investigated these specific elements with the purpose of identifying subgroups of high-risk individuals.

Existing studies on SSAs have thus focused primarily on medical and psychological data. However, employment-related factors are important social determinants of health, with a high burden in terms of attributable fractions (23). Although several studies have examined associations between occupations and death by suicide (24-27), we identified few on SAs and occupational factors (28, 29). These studies indicated that the prevalence of SI and SAs varied greatly between occupations, without any underlying relationships being defined. However, these data suggested that both low-skilled and high-skilled occupations were affected by SI and SAs. We found no studies examining SSAs across occupations.

We, therefore, aimed to compare people who had made an SSA with those who had made a non-serious suicide attempt (NSSA), with a specific focus on their socioprofessional characteristics in order to identify possible at-risk occupations and develop specific preventive interventions.

Patients and methods

Study setting and participants

The population covered by French-speaking Switzerland's observatory for monitoring self-harm (ORTS, for *Observatoire Romand de Tentatives de Suicides*), previously described by Ostertag *et al*. (30), served as the source population. The ORTS registered every patient admitted for self-harm into the emergency departments (Eds) of the Lausanne, Geneva, Valais, and Neuchâtel general hospitals between December 2016 and November 2019. Anonymized sociodemographic and clinical data collected by clinicians were used to assess whether the present study's inclusion and exclusion criteria were met and whether the selected participants would have case or control status. We included all the ORTS patients aged 18–65 years old (from adulthood to Switzerland's official retirement age for men) for whom the seriousness of their suicide attempt had been recorded.

Definition of the primary outcome variable

The seriousness of a suicide attempt was coded as a binary variable. The ORTS considers an SA to be serious when the three following conditions are met: (i) the circumstances of the act indicated a clear intention to die, (ii) the method used was highly lethal, and (iii) the ensuing somatic impairments led to sustained medical care (14). Study participants whose SA was considered serious became cases; those whose SA did not meet the criteria for an SSA became controls.

Definition of predictor variables

The following variables were used to assess whether occupation or other occupational factors could predict the seriousness of SAs: employment status, defined as either active, inactive, in training, or unknown; current occupation for actively employed participants and learned occupation for the others; and the skill level expected of employees. Milner et al. (31) defined four skill levels and demonstrated this variable's utility in suicidality studies. However, as few participants

had highly skilled or very highly skilled occupations, we grouped these categories together. Three recent significant events that might have occurred at work, namely, interruptions to employment (i.e., job loss or dismissal), suffering at work or a burnout, and mobbing, were each coded as three-class variables (yes, no, or unknown). The highest educational level achieved was coded as compulsory, intermediate, higher, or unknown, and socioeconomic status was coded as problematic, not problematic, or unknown, providing two additional socioprofessional factors of interest.

The current and learned occupations were coded using the International Standard Classification of Occupation, version 1988 (ISCO-88). For coding, we used Procode software (32) to automatically assign an ISCO-88 code and a standardized label to every occupation recorded in free text. Procode allows users to choose the degree of code precision to 1, 2, or 3 digits. We created two occupational code variables, one coded to 2 digits (31 occupational classes) and one coded to 3 digits (93 occupational classes).

Statistical analysis

The characteristics of the cases and controls were compared using chi-squared tests. As values in the predictor and confounder variables were not missing at random but clustered in the same participants, we coded them as missing and analyzed them as a distinct class. The associations between SA seriousness and socioprofessional factors were assessed using univariate and multivariable logistic regression models. Potential confounders (ED registration center, participant gender, age, residency status [Swiss, legal immigrant, illegal immigrant], presence of physical pain, SA method, and SA intentionality) were selected from the literature and the univariate analysis and then tested in the multivariate analysis. As part of our sensitivity analysis, we modelled age as a four-class variable (< 25, 26–35, 36–45, > 45) and as two two-class variables (≤ 40, > 40) and (≤ 44, > 45). We also attempted to model these associations for men and women separately. The final multivariate model was selected based on the Akaike information criteria and Bayesian information criteria, which give information on better fit (33). The results are reported as crude and adjusted odds ratios (ORs) with 95% confidence intervals (95% CIs). All analyses were performed using STATA 16.0 software (StataCorp LP, College Station, TX, USA).

Results

Description of the study sample

Of the 2,153 ORTS patients recorded, 226 were younger than 18 and 85 were older than 65. Following their exclusion, the database contained 1,842 patients, but 54 had an unknown seriousness of SA and were excluded. The remaining 1,788 participants were included in the study as 320 cases and 1,468 controls.

Compared to the controls, cases were more often men, older than 45, assessed in Lausanne's ED, were illegally resident in Switzerland, and were suffering from physical pain (Table 1). As expected, cases were twice as likely as controls to attempt to harm themselves by jumping from a great height, hanging, or asphyxiation, and to have clear suicidal intent. However, the psychiatric diagnoses and personal histories of the self-harm cases were similar to those of the controls (Table 1).

Regarding socioprofessional factors, the findings on recent interruptions to employment, suffering at work, the highest educational level achieved, and current occupational status differed significantly between the cases and controls, although the difference in occupational status was of borderline statistical significance (Table 2). The proportion of controls who were actively employed was higher than among cases, and cases were more likely to have an unknown employment status (17.50% versus 11.92%) or educational status (52.19% versus 42.92%) than controls. Interestingly, the proportion of cases and controls with an unknown skill level were very similar; however, more cases had high occupational skill levels than did controls, although this difference was not statistically significant.

A further analysis of the occupational groups coded as 3-digit variables (Table 3) revealed that architects, engineers, and related professionals (ISCO-88 code 214) were the most at-risk subgroup. Adjusting

Table 1. Characteristics of individuals who had made a serious suicide attempt and controls

	Serious self-harm (Cases)		Controls		
	n	*%*	*n*	*%*	*p-value**
	320	100.00	1,468	100.00	
Gender					
Men	165	51.56	600	40.87	**0.001**
Women	155	48.44	867	59.06	
Transgender	0	0.00	1	0.07	
Age					
18 to 25 years old	76	23.75	385	26.23	0.056
26 to 35 years old	67	20.94	371	25.27	
36 to 45 years old	65	20.31	306	20.84	
46 to 65 years old	112	35.00	406	27.66	
ED site					
Lausanne	214	66.88	730	49.73	**<0.001**
Geneva	23	7.19	186	12.67	
Neuchâtel	53	16.56	264	17.98	
Valais	30	9.38	228	19.62	
Residency status					
Swiss national	175	54.69	767	52.25	0.047
Legal immigrant	51	15.94	235	16.01	
Illegal immigrant	23	7.19	62	4.22	
Unknown or other	71	22.19	404	27.52	
Marital status					
Single	159	49.69	774	52.72	0.441
Married or registered partnership	68	21.25	321	21.87	
Divorced	52	16.25	200	13.62	
Separated	20	6.25	96	6.54	
Widowed	8	2.50	18	1.23	
Unknown	13	4.06	59	4.02	
Psychiatric diagnosis					
Depression (F3-D)	111	34.69	414	28.20	0.196
Alcohol use (F-10)	11	3.44	82	5.59	
Drugs use (F11-F19)	5	1.56	34	2.32	
Schizophrenia (F2)	23	7.19	87	5.93	
Bipolar disorders (F3-M)	9	2.81	31	2.11	
Anxiety/stress-related disorders (F4)	66	20.63	377	25.68	
Physiological disturbances (F5, F7-F9)	4	1.25	27	1.84	
Personality disorders (F6)	68	21.25	316	21.53	
Dementia (F0)	0	0.00	4	0.27	
Unknown	23	7.19	96	6.54	

	Serious self-harm (Cases)		Controls		
	n	*%*	*n*	*%*	*p-value**
Physical pain WHEN					
No	213	66.56	1066	72.62	0.035
Yes	80	25.00	274	18.66	
Unknown	27	8.44	128	8.72	
Method of suicide attempt					
Self-poisoning	180	56.25	930	63.35	<**0.001**
Cutting	31	9.69	216	14.71	
Jump from a height	35	10.94	84	5.72	
Hanging or asphyxiation	40	12.50	84	5.72	
Jumping in front of a moving object	10	3.13	38	2.59	
Multiple methods	13	4.06	45	3.07	
Unknown or other	11	3.44	71	4.84	
Level of suicidal intent					
No suicidal intent	15	4.69	394	26.84	<**0.001**
Clear suicidal intent	261	81.56	609	41.49	
Unclear suicidal intent	39	12.19	451	30.72	
Unknown	5	1.56	14	0.95	
Personal history of suicide attempts					
None	130	40.63	595	40.53	0.827
One	63	19.69	273	18.60	
Two	34	10.63	130	8.86	
Three	10	3.13	41	2.79	
More than three	53	16.56	273	18.60	
Unknown	30	9.38	156	10.63	

*Chi-squared or Fisher's exact test.

for confounders had little effect on the OR estimates but expanded the 95% CIs for most of these variables. Finally, in the fully adjusted model (Table 2), only an unknown educational level remained statistically significant, followed by a recent interruption in employment, which was of borderline significance (OR = 1.69, 95% CI = 0.92–3.10). Physical, mathematical, and engineering sciences professionals and life sciences and health professionals (ISCO-88 code 22) had an almost threefold higher risk of serious self-harm than the control group (OR = 2.87, 95% CI = 0.71–11.55). Among the former group, architects, engineers and related professionals were significantly at risk, with a tenfold higher risk of an SSA (results not shown).

Discussion

The present study compared the distribution of the demographic, clinical, and socioprofessional factors of people who had made an SSA with those who had made an NSSA. Findings regarding demographic and clinical factors were in line with previously published reports, showing associations between SSA and male gender (34, 35), age > 45 years old (36), and the presence of chronic somatic pain (37). We also found clearer SI and more violent lethal means (34, 35, 38) among patients who made an SSA. These characteristics have also been found among patients who died by suicide (male gender, age > 45 years, severe intentionality (5),

Table 2. Risk of a serious suicide attempt according to occupational variables

	Serious suicide attempt (Cases)		**Controls**		***p-value***	**Univariate model**				**Multivariate model adjusted for confounders***				**Fully adjusted multivariate model****			
	n	%	*n*	%													
	320	100.00	1,468	100.00		Crude OR	95% CI			Adjusted OR	95% CI			Fully Adj. OR	95% CI		
Employment status																	
Active	75	23.44	369	25.14	0.054	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*
Inactive	152	47.50	724	49.32		1.03	0.76	–	1.40	0.91	0.65	–	1.28	0.81	0.53	–	1.24
Training	37	11.56	200	13.62		0.91	0.59	–	1.40	0.98	0.57	–	1.68	1.11	0.60	–	2.06
Unknown	56	17.50	175	11.92		**1.57**	**1.07**	**–**	**2.33**	1.48	0.95	**–**	2.30	1.28	0.76	**–**	2.15
Skill level																	
Medium	82	25.62	391	26.63	0.158	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*
Low	9	2.81	72	4.90		0.60	0.29	–	1.24	0.60	0.28	–	1.33	2.95	0.03	–	267.33
High	55	17.19	198	13.49		1.32	0.90	–	1.94	1.23	0.81	–	1.88	1.40	0.61	–	3.18
Unknown or armed forces	174	54.37	807	54.97		1.03	0.77	–	1.37	1.03	0.74	–	1.42	0.85	0.50	–	1.45
Interruption to employment																	
No	124	38.75	495	33.72	**0.004**	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*
Yes	29	9.06	79	5.38		1.47	0.92	–	2.34	1.55	0.92	–	2.6	1.69	0.92	–	3.10
Unknown	167	52.19	894	60.90		0.75	0.58	–	0.96	0.71	0.53	–	0.96	0.74	0.33	–	1.70
Suffering at work/burnout																	
No	128	40.00	471	32.08	**0.024**	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*
Yes	16	5.00	76	5.18		0.77	0.44	–	1.37	0.79	0.43	–	1.49	0.53	0.25	–	1.17
Unknown	176	55.00	921	62.74		**0.70**	**0.55**	**–**	**0.91**	**0.68**	**0.51**	**–**	**0.90**	0.46	0.14	**–**	1.52
Mobbing																	
No	135	42.19	526	35.83	0.094	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*
Yes	4	1.25	17	1.16		0.92	0.30	–	2.77	1.05	0.31	–	3.49	1.14	0.30	–	4.40
Unknown	181	56.56	925	63.01		**0.76**	**0.60**	**–**	**0.98**	**0.73**	**0.56**	**–**	**0.98**	2.11	0.73	**–**	6.11
Highest educational level																	
Intermediate	91	28.44	543	36.99	**0.014**	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*
Compulsory	8	2.50	42	2.86		1.14	0.52	–	2.50	1.04	0.44	–	2.44	1.07	0.44	–	2.57
High	54	16.88	253	17.23		1.27	0.88	–	1.84	1.17	0.78	–	1.77	0.99	0.62	–	1.58
Unknown	167	52.19	630	42.92		**1.58**	**1.20**	**–**	**2.09**	**1.46**	**1.05**	**–**	**2.02**	**1.49**	**1.03**	**–**	**2.13**

Socioeconomic status																	
Not problematic	95	29.69	514	35.01	0.188	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*
Problematic	180	56.25	759	51.70		1.28	0.98	–	1.69	1.07	0.79	–	1.47	1.14	0.81	–	1.62
Unknown	45	14.06	195	13.28		1.25	0.84	–	1.85	1.01	0.65	–	1.56	1.01	0.63	–	1.62
ISCO-88 of 2 digits (10 of 31 cat.)																	
Personal and protective services workers (51)	28	8.75	137	9.33	0.48	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*	*1.00*	*Ref.*	–	*Ref.*
Physical, mathematical, and engineering science professionals (21)	6	1.88	8	0.54		**3.67**	**1.18**	–	**11.40**	**3.80**	**1.05**	–	**13.96**	2.87	0.71	–	11.55
Life science and health professionals (22)	4	1.25	7	0.48		2.80	0.77	–	10.20	1.87	0.44	–	7.83	1.52	0.32	–	7.31
Teaching professionals (23)	2	0.63	3	0.20		3.26	0.52	–	20.43	1.28	0.18	–	8.94	0.97	0.13	–	7.42
Customer services clerks (42)	5	1.56	13	0.89		1.88	0.62	–	5.70	1.27	0.39	–	4.20	1.37	0.40	–	4.68
Other craft and related trades workers (74)	2	0.63	25	1.70		0.39	0.09	–	1.75	0.29	0.06	–	1.42	0.30	0.06	–	1.45
Drivers and mobile plant operators (83)	3	0.94	6	0.41		2.45	0.58	–	10.37	1.82	0.37	–	9.09	1.71	0.35	–	8.40
Sales and services elementary occupations (91)	5	1.56	52	3.54		0.47	0.17	–	1.28	0.47	0.16	–	1.37	0.15	<0.01	–	14.57
Laborers in mining, construction, manufacturing, and transport (93)	1	0.31	1	0.07		4.89	0.30	–	80.58	5.54	0.09	–	359.27	*omit*	*omit*	–	*omit*
Unknown	174	54.37	805	54.84		1.06	0.68	–	1.64	0.97	0.59	–	1.57	*omit*	*omit*	–	*omit*

*A model for each occupational variable with confounders of Manuscrit_V1
**A unique model with all occupational variables and confounders

Table 3. Occupational groups coded as 3-digit variables

Study sample of last suicide attempts (SA): N = 1788	**Descriptive analysis**			**Fully adjusted logistic regression model**				
Serious suicide attempts in the study sample (SSA): N = 320	**SA, n (%)**	**SSA, n (%)**	**p-value**	**Odds Ratio**	**[95% Conf.**	**–**	**Interval]**	***p*-value**
ISCO-88 of 3 digits (14 of 93 categories)								
Housekeeping and restaurant services workers (512)	94 (5.26)	16 (5.00)	*NaN*	*Ref*	*Ref*	–	*Ref*	*Ref*
Directors and chief executives (121)	2 (0.11)	1 (0.31)	NaN	4.8750000	0.2895583	–	82.0754400	0.271
Mathematicians, statisticians, and related professionals (212)	2 (0.11)	1 (0.31)		4.8750000	0.2895583	–	82.0754400	0.271
Architects, engineers, and related professionals (214)	7 (0.39)	5 (1.56)		**12.1875000**	**2.1697630**	**–**	**68.4568700**	**0.005**
College, university, and higher education teaching professionals (231)	3 (0.17)	2 (0.63)		12.2374000	0.8330028	–	114.1203000	0.070
Optical and electronic equipment operators (313)	2 (0.11)	1 (0.31)		4.8750000	0.2895583	–	82.0754400	0.271
Life science technicians and related associate professionals (321)	4 (0.22)	2 (0.63)		4.8750000	0.6387024	–	37.2092300	0.127
Finance and sales associate professionals (341)	10 (0.56)	4 (1.25)		3.2500000	0.8219309	–	12.8508400	0.093
Artistic, entertainment, and sports associate professionals (347)	11 (0.62)	4 (1.25)		2.7857140	0.7286427	–	10.6502200	0.134
Library, mail, and related clerks (414)	5 (0.28)	2 (0.63)		3.2500000	0.5017526	–	21.0512100	0.216
Client information clerks (422)	8 (0.45)	3 (0.94)		2.9250000	0.6339429	–	13.4958900	0.169
Metal molders, welders, sheet-metal workers, structural-metal preparers, and related trades workers (721)	6 (0.34)	3 (0.94)		4.8750000	0.9010748	–	26.3747500	0.066
Domestic and related helpers, cleaners, and launderers (913)	44 (2.46)	3 (0.94)		0.3567073	0.0982131	–	1.2955510	0.117
Unknown	979 (54.75)	174 (54.37)		1.0537270	0.6005108	–	1.8489920	0.855

impulsiveness, and violent lethal means (19, 20)). Taken together, this supports the idea that individuals who had made an SSA and people who have died by suicide are two populations sharing a similar profile. At the practice level, this means that clinicians should carefully assess patients with these profiles, whether in intensive care outpatient or inpatient settings. Although this approach relies on local and national care systems, it also prompts an important question: should dedicated, tailor-made interventions for patients with an SSA profile be designed and tested, considering the specific characteristics of these suicide attempters. Further research focusing on treatments for after SSAs and for after NSSAs would thus be needed.

Our findings regarding socioprofessional factors were more challenging to interpret and compare to the existing literature, as this is scarce. The present study's most salient observation was the large amount of unknown occupational variables and missing values, some of which appeared to be possible risk factors for

SSAs. This finding raised the question of why these variables were less well assessed than all the other variables. One reason could be patients' overall clinical or psychological states, which were more severe in cases than in controls. Another reason more common to cases and controls could be their unwillingness to discuss occupational and educational factors, perhaps because of feelings of shame or guilt because of their lack of education, being unemployed, or having been fired. Finally, another reason could stem from the team members' unease about asking questions on socioprofessional factors. Indeed, some of these different reasons could also act in combination and this concern deserves investigation using an appropriate methodology.

Despite a limited amount of data and the small numbers of cases in coded occupational groups, our univariate analysis revealed that SSAs were more frequent among physical, mathematical, and engineering sciences professionals (ISCO-88 of 2-digit code 21), life sciences and health professionals (ISCO-88 of 2-digit code 22), and architects, engineers, and related professionals (ISCO-88 of 3-digit code 214). In the fully adjusted model, these associations lost their statistical significance, although their corresponding ORs remained greater than 1. These results showed, however, that the occupational groups with the most significant associations with SSAs included professionals with high skill levels. This concurs with a study involving psychiatric patients that showed that the risk of a completed suicide was higher among patients with higher skill levels (39). When assessing suicidal patients, clinicians should bear in mind that socioprofessional factors should also be carefully examined and that, although they are less often subject to precarious socioeconomic conditions, people working in professions requiring high skill levels may be at a higher risk of SSAs. At the clinical level, it is important to focus on the patient's suicidal process and on building a common therapeutic plan since death by suicide remains unpredictable at an individual level (40). However, although further research is needed to confirm our results, clinician training should include content on the links between people's occupations and their risk of an SSA. Furthermore, public health interventions could be made to provide targeted preventive actions for certain professional bodies, such as those described. Specifically, our study highlighted the need for preventive actions targeting high-risk, highly skilled groups, whereas, to date, suicide prevention efforts have focused more on vulnerable or low-income and, specifically, young populations.

The association between high skill levels and SSAs is interesting because it differs from existing data regarding socioprofessional factors and death by suicide. A poor socioeconomic status (including a low educational level and unemployment) represents a risk factor for death by suicide (41), and people in low-skilled occupations (*e.g.*, laborers, cleaners, and factory or construction workers) seem to be more at risk of death by suicide than those in highly skilled occupations (26, 31, 41-46). Indeed, research on the associations between death by suicide and occupation has identified a higher risk of suicide among the military, police, ambulance, medical, and nursing staff (26, 44, 47-50), farm workers, forestry and fisheries workers (25, 26, 43, 44, 51-53), factory workers (26, 42, 43), trades workers (26, 31), and construction workers (44). Thus, it appears that, overall, occupations with low skill levels are at a greater risk of death by suicide, whereas occupations with high skill levels are at a greater risk of an SSA.

Prevention efforts should be consistently applied after an SA, whatever the occupational category. In light of our results, the findings were insufficient to provide a robust argument for developing specific occupational interventions targeting SSAs. However, clinicians could bear in mind that physical, mathematical, and engineering sciences professionals, life sciences and health professionals, and architects, engineers, and related professionals were at a higher risk. Back in our clinic, our study encouraged us to remain particularly attentive to the types of professionals who make SAs and not only to those professions with low skill levels, as has often been the case in daily clinical practice to date. The present study explicitly investigated these socioprofessional factors in order to increase the number of characteristics that might help to identify subgroups at high risk of SAs, thus enabling more specific and truly tailored prevention strategies. Further longitudinal research is needed to confirm the identified associations and better understand this phenomenon. In

the realm of public health, it is especially important to put in place clear, visible best-practice protocols for managing patients who have attempted suicide. At present, however, it is difficult to provide sufficiently accurate clinical decision-support tools. Further studies are warranted (54-56).

Limitations

As with all observational studies, this one had some limitations. Our sample was relatively small, and future larger-scale studies are clearly needed. The socioprofessional variables had significant amounts of missing data (up to 63% in the mobbing at work variable). This particularly affected the analysis of the occupation and the skill level variables, with the latter being defined by the occupation. It is noteworthy that the proportion of missing data was similar among cases and controls. Moreover, it was similar to the proportions of missing occupational data in Switzerland's federal census, which is compulsory and covers 99% of the population. Indeed, the proportion of missing occupations in the most recent census was 34% among men and 53% among women (27). Consequently, our study's observations reflected the general trend observed in Switzerland's general population, with an important amount of missing data, either because of non-response or the inability to correctly code some responses. Retaining participants with a missing or unknown occupation and skill level as a distinct occupational subgroup in our analyses enabled us to control for potential selection bias and produce unbiased risk estimates. Moreover, it allowed us to formulate a new hypothesis regarding this sub-group for which we calculated an increased risk of SSAs. However, having so much missing data on these important variables hampered our ability to fully investigate their effects in the multivariate regression model. Another potential limitation was that we collected our data from standard psychiatric assessment records and thus relied on clinical diagnoses rather than structured, formal instruments. The same was true for suicide-related factors and other variables, which were not proactively explored (*e.g.*, socioeconomic status, sexual orientation, and legal representatives). Finally, our use of a case–control study design was the most appropriate design for exploring the data collected within the framework of the ORTS. However, a prospective follow-up of a newer ORTS sample would be even better, allowing for repeated longitudinal data collection and a more powerful statistical analysis.

Ethics Approval and Consent to Participate: This study was conducted without the need for patients' explicit informed consent. This issue was given full consideration by the relevant cantonal ethics committee on human research. The Human Research Ethics Committee of the Canton of Vaud (CER-VD) approved the project protocol (no. 2016-01489). We argued that requesting consent would have introduced a selection bias. All methods were carried out in accordance with the CER-VD's recommendations and the most recent version of the Declaration of Helsinki (57).

Funding: This study was based on institutional funding and funds from the Swiss Federal Office of Public Health, grant number 18.005478/704.0001-805/3.

Statement of Conflicts of Interest: The authors declare that they have no competing interests.

Authors' Contributions: All the authors contributed to data collection. SS, LM, IGC, JP, and PG analyzed and interpreted the patient data. All the authors read and approved the final manuscript.

References

1. Organization WH. WHO. Preventing suicide: A global imperative. 2014.
2. Organization WH. About social deterrminants of health. 2012.
3. Health SFOoP. National action plan: preventing suicide in Switzerland. 2016.
4. McGirr A, Turecki G. The relationship of impulsive aggressiveness to suicidality and other depression-linked behaviors. Curr Psychiatry Rep. 2007;9(6):460-6. doi: 10.1007/s11920-007-0062-2
5. Kim S, Choi KH, Lee KS, et al. Risk Factors for Serious Suicide Attempts with High Medical Severity. Suicide Life Threat Behav. 2020;50(2):408-21. doi: 10.1111/sltb.12597.
6. Beautrais AL. Suicides and serious suicide attempts: two populations or one? Psychol Med. 2001;31(5):837-45. doi: 10.1017/s0033291701003889.
7. Oquendo MA, Carballo JJ, Rajouria N, et al. Are high-lethality suicide attempters with bipolar disorder a distinct phenotype?

Arch Suicide Res. 2009;13(3):247-56. doi: 10.1080/13811110903044385.
8. Horesh N, Levi Y, Apter A. Medically serious versus non-serious suicide attempts: relationships of lethality and intent to clinical and interpersonal characteristics. J Affect Disord. 2012;136(3):286-93. doi: 10.1016/j.jad.2011.11.035.
9. Beautrais AL. Further suicidal behavior among medically serious suicide attempters. Suicide Life Threat Behav. 2004; 34(1):1-11. doi: 10.1521/suli.34.1.1.27772.
10. Mittendorfer-Rutz E, Rasmussen F, Wasserman D. Familial clustering of suicidal behaviour and psychopathology in young suicide attempters. A register-based nested case control study. Soc Psychiatry Psychiatr Epidemiol. 2008;43(1):28-36. doi: 10.1007/s00127-007-0266-0.
11. Beautrais AL, Joyce PR, Mulder RT. Risk factors for serious suicide attempts among youths aged 13 through 24 years. J Am Acad Child Adolesc Psychiatry. 1996;35(9):1174-82. doi: 10.1097/00004583-199609000-00015.
12. Rosen DH. The serious suicide attempt. Five-year follow-up study of 886 patients. Jama. 1976;235(19):2105-9. doi: 10.1001/jama.235.19.2105.
13. Beautrais AL. Suicide and serious suicide attempts in youth: a multiple-group comparison study. Am J Psychiatry. 2003;160(6):1093-9. doi: 10.1176/appi.ajp.160.6.1093.
14. Gvion Y, Levi-Belz Y. Serious Suicide Attempts: Systematic Review of Psychological Risk Factors. Front Psychiatry. 2018;9:56. doi: 10.3389/fpsyt.2018.00056.
15. Levi Y, Horesh N, Fischel T, Treves I, Or E, Apter A. Mental pain and its communication in medically serious suicide attempts: an "impossible situation". J Affect Disord. 2008;111(2-3):244-50. doi: 10.1016/j.jad.2008.02.022.
16. Szanto K, Clark L, Hallquist M, Vanyukov P, Crockett M, Dombrovski AY. The cost of social punishment and high-lethality suicide attempts in the second half of life. Psychol Aging. 2014;29(1):84-94. doi: 10.1037/a0035339.
17. Szanto K, Bruine de Bruin W, Parker AM, Hallquist MN, Vanyukov PM, Dombrovski AY. Decision-making competence and attempted suicide. J Clin Psychiatry. 2015; 76(12):e1590-7. doi: 10.4088/JCP.15m09778.
18. McGirr A, Dombrovski AY, Butters MA, Clark L, Szanto K. Deterministic learning and attempted suicide among older depressed individuals: cognitive assessment using the Wisconsin Card Sorting Task. J Psychiatr Res. 2012;46(2): 226-32. doi: 10.1016/j.jpsychires.2011.10.001.
19. Gvion Y, Horresh N, Levi-Belz Y, et al. Aggression-impulsivity, mental pain, and communication difficulties in medically serious and medically non-serious suicide attempters. Compr Psychiatry. 2014;55(1):40-50. doi: 10.1016/j.comppsych.2013.09.003.
20. Doihara C, Kawanishi C, Yamada T, et al. Trait aggression in suicide attempters: a pilot study. Psychiatry Clin Neurosci. 2008;62(3):352-4. doi: 10.1111/j.1440-1819.2008.01804.x.
21. Elliott AJ, Pages KP, Russo J, Wilson LG, Roy-Byrne PP. A profile of medically serious suicide attempts. J Clin Psychiatry. 1996;57(12):567-71. doi: 10.4088/jcp.v57n1202.
22. Marzano L, Hawton K, Rivlin A, Fazel S. Psychosocial influences on prisoner suicide: a case-control study of near-lethal self-harm in women prisoners. Soc Sci Med. 2011;72(6):874-83. doi: 10.1016/j.socscimed.2010.12.028.
23. Niedhammer I, Milner A, LaMontagne AD, Chastang JF. Study of the validity of a job-exposure matrix for the job strain model factors: an update and a study of changes over time. Int Arch Occup Environ Health. 2018;91(5):523-36. doi: 10.1007/s00420-018-1299-2.
24. Wild P, Bovio N, Guseva Canu I. Part-time work and other occupational risk factors for suicide among working women in the Swiss National Cohort. Int Arch Occup Environ Health. 2021;94(5):981-90. doi: 10.1007/s00420-020-01629-z.
25. Bossard C, Santin G, Guseva Canu I. Suicide Among Farmers in France: Occupational Factors and Recent Trends. J Agromedicine. 2016;21(4):310-5. doi: 10.1080/1059924X.2016.1211052.
26. Guseva Canu I, Bovio N, Mediouni Z, Bochud M, Wild P. Suicide mortality follow-up of the Swiss National Cohort (1990-2014): sex-specific risk estimates by occupational socio-economic group in working-age population. Soc Psychiatry Psychiatr Epidemiol. 2019;54(12):1483-95. doi: 10.1007/s00127-019-01728-4.
27. Schmid M, Michaud L, Bovio N, Guseva Canu I. Prevalence of somatic and psychiatric morbidity across occupations in Switzerland and its correlation with suicide mortality: results from the Swiss National Cohort (1990-2014). BMC Psychiatry. 2020;20(1):324. doi: 10.1186/s12888-020-02733-7.
28. Howard M, Krannitz M. A Reanalysis of Occupation and Suicide: Negative Perceptions of the Workplace Linked to Suicide Attempts. J Psychol. 2017;151(8):767-88. doi: 10.1080/00223980.2017.1393378.
29. Han B, Crosby AE, Ortega LA, Parks SE, Compton WM, Gfroerer J. Suicidal ideation, suicide attempt, and occupations among employed adults aged 18-64years in the United States. Compr Psychiatry. 2016;66:176-86. doi: 10.1016/j.comppsych.2016.02.001.
30. Ostertag L, Golay P, Dorogi Y, et al. The implementation and first insights of the French-speaking Swiss programme for monitoring self-harm. Swiss Med Wkly. 2019;149:w20016. doi: 10.4414/smw.2019.20016.
31. Milner A, Spittal MJ, Pirkis J, LaMontagne AD. Suicide by occupation: systematic review and meta-analysis. Br J Psychiatry. 2013;203(6):409-16. doi: 10.1192/bjp.bp.113.128405.
32. Savic N, Bovio N, Gilbert F, Paz J, Guseva Canu I. Procode: A Machine-Learning Tool to Support (Re-)coding of Free-Texts of Occupations and Industries. Ann Work Expo Health. 2021. doi: 10.1093/annweh/wxab037.
33. Schwarz G. Estimating the dimension of a model. The annals of statistics. 1978;6(2):461-4. doi: 10.1214/aos/1176344136.
34. Choo CC, Harris KM, Ho RC. Prediction of Lethality in Suicide Attempts: Gender Matters. Omega (Westport). 2019;80(1):87-103. doi: 10.1177/0030222817725182.
35. Kim DW, Cho SE, Kang JM, et al. Risk Factors for Serious Suicide Attempts: Difference Between Older and Younger Attempters in the Emergency Department. Front Psychiatry. 2020;11:607811. doi: 10.3389/fpsyt.2020.607811.

36. Conwell Y, Duberstein PR, Cox C, Herrmann J, Forbes N, Caine ED. Age differences in behaviors leading to completed suicide. Am J Geriatr Psychiatry. 1998;6(2):122-6. doi: 10.1097/00019442-199805000-00005.
37. Erlangsen A, Stenager E, Conwell Y. Physical diseases as predictors of suicide in older adults: a nationwide, register-based cohort study. Soc Psychiatry Psychiatr Epidemiol. 2015;50(9):1427-39. doi: 10.1007/s00127-015-1051-0.
38. Beck AT, Beck R, Kovacs M. Classification of suicidal behaviors: I. Quantifying intent and medical lethality. Am J Psychiatry. 1975;132(3):285-7. doi: 10.1176/ajp.132.3.285.
39. Agerbo E. High income, employment, postgraduate education, and marriage: a suicidal cocktail among psychiatric patients. Arch Gen Psychiatry. 2007;64(12):1377-84. doi: 10.1001/archpsyc.64.12.1377.
40. Hawton K, Lascelles K, Pitman A, Gilbert S, Silverman M. Assessment of suicide risk in mental health practice: shifting from prediction to therapeutic assessment, formulation, and risk management. Lancet Psychiatry. 2022;9(11):922-8. doi: 10.1016/S2215-0366(22)00232-2.
41. Nordt C, Warnke I, Seifritz E, Kawohl W. Modelling suicide and unemployment: a longitudinal analysis covering 63 countries, 2000-11. Lancet Psychiatry. 2015;2(3):239-45. doi: 10.1016/S2215-0366(14)00118-7.
42. Boxer PA, Burnett C, Swanson N. Suicide and occupation: a review of the literature. J Occup Environ Med. 1995;37(4): 442-52. doi: 10.1097/00043764-199504000-00016.
43. Gallagher LM, Kliem C, Beautrais AL, Stallones L. Suicide and occupation in New Zealand, 2001-2005. Int J Occup Environ Health. 2008;14(1):45-50. doi: 10.1179/oeh .2008.14.1.45.
44. Meltzer H, Griffiths C, Brock A, Rooney C, Jenkins R. Patterns of suicide by occupation in England and Wales: 2001-2005. Br J Psychiatry. 2008;193(1):73-6. doi: 10.1192/bjp .bp.107.040550.
45. Windsor-Shellard B, Gunnell D. Occupation-specific suicide risk in England: 2011-2015. Br J Psychiatry. 2019:1-6. doi: 10.1192/bjp.2019.69.
46. Mustard CA, Bielecky A, Etches J, et al. Suicide mortality by occupation in Canada, 1991-2001. Can J Psychiatry. 2010;55(6):369-76. doi: 10.1177/070674371005500.
47. Roberts SE, Jaremin B, Lloyd K. High-risk occupations for suicide. Psychol Med. 2013;43(6):1231-40. doi: 10.1017 /S0033291712002024.
48. Dutheil F, Aubert C, Pereira B, et al. Suicide among physicians and health-care workers: A systematic review and meta-analysis. PLoS One. 2019;14(12):e0226361. doi: 10.1371 /journal.pone.0226361.
49. Hawton K, Agerbo E, Simkin S, Platt B, Mellanby RJ. Risk of suicide in medical and related occupational groups: a national study based on Danish case population-based registers. J Affect Disord. 2011;134(1-3):320-6. doi: 10.1016 /j.jad.2011.05.044.
50. Hawton K, Simkin S, Rue J, Haw C, Barbour F, Clements A, et al. Suicide in female nurses in England and Wales. Psychol Med. 2002;32(2):239-50. doi: 10.1017/s003329170 1005165.
51. Wada K, Eguchi H, Prieto-Merino D, Smith DR. Occupational differences in suicide mortality among Japanese men of working age. J Affect Disord. 2016;190:316-21. doi: 10.1016/j.jad.2015.10.032.
52. Judd F, Jackson H, Fraser C, Murray G, Robins G, Komiti A. Understanding suicide in Australian farmers. Soc Psychiatry Psychiatr Epidemiol. 2006;41(1):1-10. doi: 10.1007 /s00127-005-0007-1.
53. Browning SR, Westneat SC, McKnight RH. Suicides among farmers in three southeastern states, 1990-1998. J Agric Saf Health. 2008;14(4):461-72. doi: 10.13031/2013.25282.
54. Henry J, Ramages M, Cheung G. The development of patient suicide post-vention guidelines for psychiatry trainees and supervisors. Australas Psychiatry. 2020;28(5):589-94. doi. 10.1177/1039856220930687.
55. Montanari Vergallo G, Zaami S. Guidelines and best practices: remarks on the Gelli-Bianco law. Clin Ter. 2018; 169(2):e82-e5. doi: 10.7417/T.2018.2059.
56. Agius M. Guidelines in psychiatry. Psychiatr Danub. 2010;22 Suppl 1:S42-5. PMID: 21057401.
57. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. Jama. 2013;310(20):2191-4. doi: 10.1001/jama.2013.281053.

Correspondence:
Received: 20 October 2023
Accepted: 9 January 2024
Saillant Stéphane, MD-PD
Department of General and Liaison Psychiatry, Neuchatel Psychiatric Center, Switzerland
Maladiere 45, CH-2000 Neuchatel
Phone: +41799050459
E-mail: stephane.saillant@cnp.ch