BMC Health Services Research

RESEARCH

Open Access

Profiles of quality of care among individuals with suicidal behaviors

Marie-Josée Fleury[1,2*], Zhirong Cao[2], Guy Grenier[2] and Xiangfei Meng[3]

Abstract

Objectives This study identified profiles of individuals with suicidal behaviors (ideations, plans, attempts) and quality of outpatient care received, associated these profiles to the respondents' sociodemographic and clinical characteristics, and measured outcomes.

Methods Using a representative population-based 2015–2016 survey from Quebec (Canada) merged with the province's health registry (1996–2017), cluster analysis and multinomial logistic regressions were conducted on 569 respondents experiencing suicidal behaviors.

Results Among the four identified profiles, 63% had suicidal ideations only (Profile 1, 40% of the cohort; Profile 2, 23%), while 37% reported suicidal plans (mostly Profile 4, 15%) or attempts (mainly Profile 3, 22%) – of Profiles 3 and 4 about one-third reported suicide attempts over their lifetime. Before exhibiting suicidal behaviors, 56% had received low quality of outpatient care – mainly Profiles 1 and 4. Those with the worst social and health conditions, including more serious mental disorders, received the best MH care: Profile 2 patients (suicidal ideations only) received high continuity and regularity of recovery-oriented care; those of Profile 3 (more suicide attempts and unmet needs) received more intensive care. Being older with higher rates of suicidal plans or attempts – and with over 50% of them having mental disorders –, Profile 4 patients received low quality of care and showed the worst outcomes (acute care use, lower quality of life, bad or poor physical/mental health conditions), followed by Profiles 3, 2 and 1. Profile 1 patients also received low quality of care, but showed the best outcomes, probably because of better social and clinical conditions and the fact all of them only had suicidal ideations.

Conclusion Quality of care was higher in patients with worse social and health conditions (Profiles 2 and 3). However, findings showed that services could be substantially improved to prevent suicidal behaviors, with outreach interventions significantly strengthened for Profiles 1 and 4. Services could protect patients better against suicidal behaviors and adverse outcomes if they more closely matched their needs and the severity of their conditions. In this sense, Profile 3 and 4 patients would benefit from more continuous follow-up care over time.

Keywords Suicidal behaviors, Cluster analysis, Typology, Service use, Quality of care, Sociodemographic and clinical correlates, Adverse outcomes

*Correspondence:
Marie-Josée Fleury
flemar@douglas.mcgill.ca
[1]Department of Psychiatry, McGill University, Montreal, QC, Canada
[2]Douglas Hospital Research Centre, 6875 LaSalle Blvd., Montreal, QC H4H 1R3, Canada
[3]Interdisciplinary School of Health Sciences, University of Ottawa, Ottawa, ON, Canada

Introduction

Suicide is an important cause of mortality worldwide [1], particularly among adolescents and young adults. For each individual dying by suicide, it is estimated that 20 others have attempted suicide at least once [2, 3]. Suicidal behaviors, including suicidal ideations, plans and attempts, are acknowledged to be key predictors of suicide [4]. More prevalent among younger individuals [5], suicidal behaviors are strongly associated with mental disorders (MDs) [6], substance-related disorders (SRDs) [7], co-occurring MDs-SRDs [8] and chronic physical illnesses [9]. They also contribute to elevate emergency department (ED) use and hospitalizations [10]. According to a recent systematic review, in the 12 months before their death, 80% of individuals who died by suicide had used primary care, and 57% had sought mental health (MH) services – 44% and 31%, respectively, in the month before dying [11]. Women, white people, adults diagnosed with major depression, who have more psychological distress and worse overall medical conditions are more likely to use MH services for suicidal behaviors [12].

Risk factors may differ between types of suicidal behaviors. Women are more likely to have both suicidal ideations and attempts, while men show higher completed suicide rates [13]. Compared to individuals with suicidal ideations, those who attempted suicide usually report worse conditions, notably past experiences of violence and sexual abuse, chronic suicidal ideations, worse executive functioning [4, 14], and psychotic symptoms, and are known to use heroin or other drugs intravenously [15]. Individuals harboring suicidal plans ressemble those who attempted suicide more than those with suidical ideations, as they have more serious health and social conditions [16]. Having more outpatient psychiatric care and previous hospitalizations [17] reduced the odds of using ED for suicidal ideations, while receiving more psychosocial outpatient interventions [17] reduced those of using ED for suicide attempts. Since individuals with suicidal behaviors are not a homogenous group, identifying distinct profiles may help implement tailored interventions that prevent or reduce suicide risk, particularly among high-risk individuals.

Most studies on suicidal behavior typologies assessed adolescents [18–20] and young adults [21, 22] based on their sociodemographic and clinical conditions. These studies usually identify two to five profiles, including one or two with high suicide risk, more past suicidal behaviors [18, 23], and complex social and health problems like being more isolated from family or having difficulties in school, past physical [20] or sexual abuse [24], MDs like depression [22] or personality disorders [20], SRDs [22], and co-occurring MDs-SRDs [23]. Those profiles were also more likely to use EDs and to be hospitalized or medicated [24]. A few studies linked suicidal behaviors to quality of life, and found that profiles with less risky suicidal behaviors reported a higher quality of life [19, 25]. Of the few typologies that included adult populations, one found four profiles [26]. Profiles 1 and 4 experienced multiple episodes of suicidal behaviors (both ideations and attempts) and had more severe health conditions. Profile 1 received high continuity and frequency of biopsychosocial care, whereas Profile 4 had low continuity and frequency of physician care and only moderate psychosocial care. Profiles 2 and 3 typically had a single episode of suicidal behavior, mainly ideations. Profile 2 mostly presented with common MDs and received moderate biopsychosocial care, while Profile 3 lacked family physician or psychiatric care, with only about one-third receiving psychosocial services. Profiles 1 and 4 used acute care (ED visits and hospitalizations) more frequently than Profiles 2 and 3. Profiles 3 and 4 encompassed more men and younger individuals. Profiles 1 and 4 showed higher risk of death than Profiles 2 and 3.

The current study is original in that it investigates profiles within a representative general population age 12+, integrating quality of care received before the suicidal behaviors occurred, and differentiating suicidal ideations from suicide plans or attempts over the 12 months preceding each respondent's interview, controlling for previous suicidal attempts over the lifetime. We found no previous study that identifies quality-of-care indicators, differentiates between suicidal plans and other suicidal behaviors, and links these data with suicidal behavior profiles. Providing quality care that's adapted to the individual's needs and factors in suicidal behavior severity is a key issue in several countries – including Canada, where access to care is particularly poor [27, 28]. Rapid access to outpatient care after hospital discharge [29] and care continuity [30] are considered key to prevent suicide or reduce its likelihood. Quality of care is a multidimensional concept that may include access (e.g., family physician, health insurance), intensity (i.e. frequency of service use), diversity (e.g., biopsychosocial care) and regularity of care [31, 32], as well as recovery-oriented services [33]. Few previous typologies of individuals exhibiting suicidal behaviors have also linked the profiles they found to outcomes – death, acute care use, perceived health conditions, quality of life. Through a large cohort representative of Quebec's (Canada) population based on merged data from a population survey and health registry, this study identified profiles of individuals with suicidal behaviors (ideations, plans, attempts) and quality of outpatient care received, associated these profiles to the patients' sociodemographic and clinical characteristics, and measured outcomes.

Methods

Study design and sample

This study investigated the Care Trajectories – Enriched Data Cohort (TorSaDE), which includes all Quebec residents who participated in the 2015–2016 Canadian Community Health Survey (CCHS), a Statistics Canada cross-sectional survey representative of the Canadian population. The CCHS contains self-reported data on sociodemographic and clinical characteristics, health determinants, and healthcare use, which were merged with 1996–2017 (April 1 to March 31) data from the Quebec Ministry of Health and Social Services, and the Health Insurance Board. The following databases were included: Health Insurance Registry (FIPA, mostly demographic patient data), Physician Claims (RAMQ), Hospital Inpatient and Day Surgery (MED-ECHO), ED service use (BDCU), Community Healthcare Center (I-CLSC, mostly psychosocial services), and Death databases (RED) – for the official French names of these databases, see Table 1 footnotes. In 2016–2017, only 6% of physician billing occurred outside the public system [34].

Using Quebec's 2015–2016 CCHS, this study included 21,497 potential respondents whose their health insurance registry data (e.g., FIPA, RAMQ) were linked with their survey data. When a variable appeared in multiple databases (e.g., MED-ECHO, BDCU), including the CCHS, all relevant data were combined (see Table 1 footnotes). To be included in the cohort, respondents had to have suicidal behaviors reported in the 12 months preceding their interview date (referred hereafter as the "index date"). Respondents hospitalized for over 90 days in the year preceding their index date were excluded to avoid interference with the measurement of quality of outpatient care received. This study adhered to the STROBE guideline for epidemiological studies [35]. The Research Ethics Board (REB) of a MH organization approved the study (*Centre intégré universitaire de santé et de services sociaux* (CIUSSS) *de l'Ouest-de-l'Île-de-Montréal*).

Study variables and timeframes

The respondents' profiles were based on suicidal behaviors and quality of outpatient care received, assessed within the 12 months preceding index date – except access to a family physician, family medicine group or any other usual MH clinician, which was measured for the 3-year period before index date, and repeated suicidal attempts, which were measured over lifetime. Suicidal behaviors were categorized in three hierarchic groups: suicidal ideations only, suicidal plans (including possible suicidal ideations), and suicide attempts (including possible suicidal ideations and plans). Prior suicide attempts over the lifetime (CCHS/health registry), needs for care and acute care use for suicidal behaviors were also considered. "Needs for care" was assessed through this CCHS question: "Following your most recent suicidal behaviors, did you require medical attention?" If the respondent answered "yes", they were deemed as "needing care" for their suicidal behaviors. Quality of outpatient care received encompassed: access to a family physician, family medicine group or any other usual MH clinician; any GP care for MH reasons; psychiatric care or MH care from clinicians other than physicians; high continuity of physician care; intensity or regularity of MH care; sufficient consultation time (a proxy for recovery-oriented services); and access to private insurance.

Distinctions were made between having access to a family physician with whom patients are registered, and receiving care from GPs who can see random patients in walk-in clinics and don't provide follow-up care to all patients – a common practice in Canada [36]. Patients could have access to a family physician without having received any general practitioner (GP) care over the previous year. In Quebec, most family physicians work in family medicine groups, which are GP group clinics where patients are registered and where patients can receive extended care by psychosocial services mostly delivered by nurses and social workers [37]. Patients with access to a family physician, a family medicine group or psychosocial MH resources were designated as having a usual MH clinician – a proxy for "case manager". High continuity of physician care was measured with the Usual Provider Continuity Index [38], accounting for the proportion of outpatient consultations with the family physician or usual psychiatrist out of all physicians consulted. The "usual psychiatrist" designation required the patient to have had at least two consultations with the same psychiatrist. High continuity of physician care required a score of ≥ 0.80 [39]. The "MH clinicians other than physicians" designation included psychosocial clinicians working in public community healthcare centers (mostly delivering psychosocial services) or in hospital settings, or psychologists working in private practice. Having access to several types of providers (e.g., family physician, other GPs, psychiatrists, other MH clinicians) was associated with "diversity of care". Intensity and regularity of MH care measured the services actually received from all of the aforementioned MH providers. Intensity of MH care could be quantified as 0 (the patient did not get formal help), 1–10, or 11 + services received over a 12-month period, considering an adequate distribution of patients between these three groups. In this context, 10 services could represent about one service use per month, or more services received over a few months. As an indicator of close patient follow-up [40], regularity of care indicated whether patients received low (services received < 2 periods), moderate (in 2 periods) or high (3 periods) regularity of MH care in each of the 4-month periods of a 12-month cycle. As opposed to

Table 1 Characteristics of respondents exhibiting suicidal behaviors (*N* = 569, or as specified)

		n	%
Suicidal behaviors and quality of care received – measured over the 12 months preceding the date of each respondent's interview (the index date), or other as specified			
Suicidal behaviors [a, b, c]	Suicidal ideations only	358	62.92
	Suicidal plans	102	17.93
	Suicide attempts	109	19.16
Prior suicide attempts over lifetime (before 2015–2016) [a, b, c]		115	20.21
Needs for care for suicidal behaviors [a]		113	19.86
Acute care use for suicidal behaviors [b, c]		60	10.54
Access to a family physician, family medicine group or any other usual mental health (MH) clinician (measured over a 3-year period before index date) [a, d, e]		492	86.47
Received any general practitioner (GP) care for MH reasons [a, d, e]		254	44.64
Received any psychiatric care [a, d]		126	22.14
High continuity of physician care (≥ 0.8) [a, d, e]		343	60.28
Received care from MH clinicians other than physicians [a, e]		327	57.47
Intensity of MH care received (by GPs, psychiatrists and other MH clinicians) [a, d, c]	0	154	27.07
	1–10	245	43.06
	11+	170	29.88
Regularity of MH care by any provider (4 months per period) [a, d, e]	Low (services received < 2 periods)	239	42.00
	Moderate (services received in 2 periods)	128	22.50
	High (services received in 3 periods)	202	35.50
Sufficient consultation time (recovery-oriented care) [a]		416	73.11
Access to private insurance [a]		474	83.30
Respondent sociodemographic characteristics (measured at index date)			
Sex [a]	Men	259	45.52
	Women	310	54.48
Age (years) (mean/SD.) [a]		43.53	17.99
Age group (years) [a]	12–24	113	19.86
	25–44	180	31.63
	45–64	199	34.97
	65+	77	13.53
Single (including separated, divorced, widowed) [a]		425	74.69
Education level (*N* = 565) [a]	Less than secondary education	152	26.90
	Secondary education	119	21.06
	Post-secondary education	294	52.04
Unemployed or retired [a *]		223	39.19
Household income (Can$) (*N* = 566) [a]	0–19,999	146	25.80
	20,000–79,999	322	56.89
	80,000+	98	17.31
Homeownership [a]		267	46.92
Food insecurity (*N* = 535) [a]		178	33.27
Types of residential areas [f]	Urban (> 100,000)	245	43.06
	Semi-urban (10,000 to 100,000)	166	29.17
	Rural (< 10,000)	158	27.77
Respondent clinical characteristics (measured within 12 months before index date, or other as specified)			
Principal mental disorders (MDs) [a, b, c, d]	No MDs	203	35.68
	Serious MDs	66	11.60
	Common MDs	277	48.68
	Substance-related disorders (SRDs) only	23	4.04
Prior episodes of MDs, including SRDs (measured from 1996 to principal MD diagnosis, including a 3-year clearance period without any MD) [a, b, c, d]		135	23.73
Co-occurring MDs-SRDs [a, b, c, d]		60	10.54
Chronic physical illnesses [a, b, c, d]		184	32.34

Table 1 (continued)

	n	%
Obesity (*N* = 517) [a]	111	21.47
High perceived level of stress in daily life/work (*N* = 567) [a]	210	37.04
Respondents' outcomes (measured at index date, or other as specified) *		
Death (measured over the 3 months following index date) [g]	0	0
Acute care use for MH reasons (measured over the 3 months following index date) [b, c]	23	4.04
Bad or poor perceived physical/MH conditions (measured in general on a standard day at index date) [a]	282	49.56
Quality of life (mean/SD – /10) (measured in general on a standard day at index date) [a]	6.17	2.23

[a] Canadian Community Health Survey (CCHS) 2015–2016 survey; [b]*Maintenance et exploitation des données pour l'étude de la clientèle hospitalière* (MED-ECHO, Hospital Inpatient and Day Surgery Database); [c]*Banque de données communes des urgences* (BDCU, Emergency Department (ED) Database); [d]*Régie de l'assurance maladie du Québec* (RAMQ, Physician Claims Database); [e]*Système d'information permettant la gestion de l'information clinique et administrative dans le domaine de la santé et des services sociaux* (I-CLSC, Psychosocial Interventions in Community Healthcare Centers, including GPs working on salary); [f]*Fichier d'inscription des personnes assurées* (FIPA, Health Insurance Registry). [g]*Fichier des décès du Registre des évènements démographiques* (RED, Vital Statistics Death database). *A total of 15% (*n* = 86) of respondents were classified as retired. Respondents aged ≥ 65 who were unemployed were also assigned to the retired group. Due to the small sample size, this group was combined with the unemployed group for the analysis

intensity of care, regularity of care measured whether patients received "constant" formal help over the previous year. "Recovery-oriented services" are considered key to patient recovery [41], as is access to private insurance – even though the Quebec population has access to public healthcare, key services like psychotherapy are mainly provided though psychologists in private practice [42].

The respondents' sociodemographic and clinical characteristics were assessed and associated with profiles of suicidal behaviors and quality of outpatient services received. Sociodemographic characteristics were evaluated at index date. Recognized as significant MD risk factors [43], sociodemographic characteristics included: sex at birth, age group (e.g., 12–24), being single, education level (e.g., secondary education), occupation (e.g., unemployed), household income (e.g., < 20,000), homeownership, food insecurity (i.e., feeling that one has limited or unreliable access to food), and types of residential areas (e.g., urban areas).

Clinical characteristics were: principal MDs, prior MD episodes (including SRDs), co-occurring MDs-SRDs, chronic physical illnesses, obesity, and high perceived level of stress in daily life/work. Those were measured within the 12 months preceding index date, except prior MD episodes, which were assessed from 1996 up to the date of the principal MD diagnosis – including a 3-year clearance period without MDs, as MDs are often chronic conditions with acute episodes [44]. For example, if a patient had an MD (or SRD) episode in 2000 and another in 2009, it was registered as two prior MD episodes, thus this patient was considered as having "prior episodes of MDs". Principal MDs were categorized hierarchically as follows, considering their severity and chronicity: serious MDs (e.g., schizophrenia spectrum and other psychotic, bipolar, personality disorders); common MDs (e.g., anxiety, depressive, adjustment disorders); SRDs only (alcohol/drug use, induced substances, use disorders, intoxication, withdrawal), integrating risky alcohol use (5 + drinks several times a week) – an indicator that can substantially impact on an individual's functioning and relationships [45, 46]. For example, if a patient was diagnosed with schizophrenia and anxiety disorders as well as SRDs, they were categorized as having "serious MDs", whereas a patient with depressive and anxiety disorders but no other MD diagnosis would fall under "common MDs", and a patient with SRDs but no other MDs would be categorized as having "SRDs only". Respondents could also have no MDs, yet exhibit suicidal behaviors. Chronic physical illnesses (e.g., diabetes, cardiovascular diseases) were assigned using an adapted integrated version of the Elixhauser and Charlson Comorbidity Indexes [47]. Diagnostic codes in the health registry were based on the International Classification of Diseases, Ninth or Tenth Revisions (Appendix 1).

The outcomes associated with each profile included death for any cause and acute care for MH reasons, both measured over the 3 months following index date (with the latest date being March 31, 2017); bad or poor perceived physical/MH conditions and quality of life were both measured at index date with a question asking how the individual feels "in general on a standard day". Acute care was used as a proxy for adverse outcomes or unmet needs in outpatient care [48], with hospitalizations reflecting a patient's vulnerability [49, 50]. Paradoxically, bad or poor perceived physical/MH conditions and quality of life may be associated with a high degree of satisfaction with care received, particularly in individuals with chronic disorders requiring ongoing treatment [51, 52]. In the CCHS, quality of life was measured on a 10-point scale with the question: "How satisfied are you with your life in general?" Higher scores indicated greater satisfaction.

Analysis

Univariate analyses consisted of frequency distributions for categorical variables and mean values with standard deviations for continuous variables. Cluster analysis was conducted using the k-means algorithm with the Gower

dissimilarity coefficient. Several k-means solutions with varying numbers of clusters (or profiles) were computed for comparison based on the Calinski–Harabasz pseudo-F value [53]. Although Latent Class Analysis (LCA) was considered as an alternative, it typically requires sample sizes that are quite large. Since we wanted to include in the clusters several variables related to suicidal behaviors and quality of outpatient care received, the study's sample size was judged insufficient for reliable LCA results [54]. To assess covariate differences between profiles, bivariate multinomial logistic regression was employed, while multinomial logistic regression, adjusted for sex and age, was used for outcome comparisons, with risk ratios (RRs) calculated accordingly. All analyses were performed using Stata version 18.

Results

Sample size and respondent characteristics

Among the 21,497 respondents who were part of the 2015–2016 CCHS, 572 (2.7%) had suicidal behaviors; three were excluded for having been hospitalized over 90 days in the year before their index date, for a final sample of 569 respondents. In the 12 months preceding the index date, 19% attempted suicide, 18% harbored suicidal plans, 63% suicidal ideations only, 20% reported needs for care and 11% used acute care for their suicidal behaviors. Overall, 20% declared having attempted suicide over their lifetime (Table 1). Though most (86%) had access to a family physician, family medicine group or a usual MH clinician, only 45% actually received GP care, 22% psychiatric care, 57% other MH clinician care, and 60% high continuity of physician care. About a third received high intensity (30%) or regularity of care (36%); 73% reported recovery-oriented care, and 83% had private insurance.

Most respondents were women (54%), aged 45–64 (35%); 75% were single, 52% had post-secondary education, 57% had a household income of 20,000–79,999 CAD, 47% were homeowners, 43% lived in urban areas, and 33% had food insecurity. Most (49%) had common MDs, 24% prior MD episodes, 11% co-occurring MDs-SRDs, 32% chronic physical illnesses, 21% obesity, and 37% perceived high levels of stress in their daily life/work. Considering outcomes, in the 3 months following index date no respondent died, 4% used acute care, 50% perceived their physical/MH conditions to be poor or bad, and the quality-of-life mean score was 6/10 ("quite poor").

Profiles of suicidal behaviors and quality of outpatient care received

A four-class model was created, yielding the highest Calinski–Harabasz pseudo-F value, which indicated the most distinct clustering. All Profile 1 respondents (40% of sample) only had suicidal ideations, but few reported needs for care (7%), received acute care (5%) for suicidal behaviors, or declared prior suicide attempts over their lifetime (8%) (Table 2). Though most of them (81%) had access to a family physician, family medicine group or other usual MH clinician, only a minority had actually received care from a GP (25%), psychiatrist (4%) or other MH clinician (37%), or reported high continuity of care (43%). Profile 1 had the most respondents who didn't receive any MH care (44%) and showed low regularity of care (73%). Profile 1 was labeled "Respondents with suicidal ideations and low quality of care".

All Profile 2 respondents (23% of sample) had suicidal ideations, but few reported needs for care (12%) and acute care use (9%) for suicidal behaviors, or prior suicide attempts during their lifetime (9%). They reported the best access to a family physician, family medicine group or other usual MH clinician (96%), and the highest continuity (84%) or regularity (88%) of recovery-oriented care (85%). They came second highest in intensity of care (54%) and as having private insurance (87%). Profile 2 was labeled "Respondents with suicidal ideations, and high continuity and regularity of recovery-oriented care".

Profile 3 (22% of sample) was exclusively made up of respondents who had attempted suicide (60%) or harbored suicidal plans (40%). They ranked first in prior suicide attempts over lifetime (44%), in needs for care (48%), and in acute care received for suicidal behaviors (25%). Profile 3 respondents actually received the most care from GPs (73%), psychiatrists (46%) and other MH clinicians (89%). This profile included the most respondents with high care intensity (65%) and private insurance (89%), ranked second in high continuity (80%) and regularity of care (71%), and in recovery-oriented care (82%). Profile 3 was labeled "Respondents with suicide attempts, more unmet needs, but receiving more intensive care".

Profile 4 (15% of sample) was exclusively comprised of respondents who had harbored suicidal plans (61%) or attempted suicide (39%). It featured the second highest percentage of respondents with prior suicide attempts in their lifetime (34%), and needs for care for suicidal behaviors (25%). Compared to other profiles, fewer Profile 4 respondents had access to a family physician, family medicine group or other usual MH clinician (77%), or had used MH clinicians other than physicians (33%); they were more numerous to show low regularity of care (82%), but fewer of them had private insurance (77%). They ranked last in recovery-oriented care (60%), and second to last in receiving GP care (30%) or psychiatric care (15%), and in high continuity (44%) or intensity of care (7%). Profile 4 was labeled "Respondents with suicidal plans and low quality of care".

Table 2 Respondent profiles of suicidal behaviors and quality of care received: 4-class model (*N* = 569)

Measured over the 12 months preceding index date, or other as specified		Profile 1: Respondents with suicidal ideations and low quality of care	Profile 2: Respondents with suicidal ideations, and high continuity and regularity of recovery-oriented care	Profile 3: Respondents with suicide attempts, more unmet needs, but receiving more intensive care	Profile 4: Respondents with suicidal plans and low quality of care
Group size: *n* (%)		**229 (40.25%)**	**129 (22.67%)**	**124 (21.79%)**	**87 (15.29%)**
		%	**%**	**%**	**%**
Suicidal behaviors	Suicidal ideations only	100.00	100.00	0.00	0.00
	Suicidal plans	0.00	0.00	39.52	60.92
	Suicide attempts	0.00	0.00	60.48	39.08
Prior suicide attempts over lifetime		8.30	8.53	44.35	34.48
Needs for care for suicidal behaviors		6.99	11.63	48.39	25.29
Acute care use for suicidal behaviors		4.80	9.30	25.00	6.90
Access to a family physician, family medicine group or any other usual mental health (MH) clinician (measured over the 3-year period before index date)		80.79	96.12	93.55	77.01
Received any general practitioner (GP) care for MH reasons		25.33	61.24	73.39	29.89
Received any psychiatric care		4.37	35.66	45.97	14.94
High continuity of physician care (≥ 0.8)		42.79	83.72	79.84	43.68
Received care from MH clinicians other than physicians		37.12	79.84	88.71	33.33
Intensity of MH care received (by GPs, psychiatrists and other MH clinicians)	0	47.16	5.43	0.81	43.68
	1–10	46.72	40.31	34.68	49.43
	11+	6.11	54.26	64.52	6.90
Regularity of MH care by any provider (4 months per period)	Low (services received < 2 periods)	73.36	0.00	0.00	81.61
	Moderate (services received in 2 periods)	26.64	11.63	29.03	18.39
	High (services received in 3 periods)	0.00	88.37	70.97	0.00
Sufficient consultation time (recovery-oriented care)		66.81	84.50	82.26	59.77
Access to private insurance		80.79	86.82	88.71	77.01

*K-mean analysis based on Calinski–Harabasz pseudo-F value

Associations between profiles and sociodemographic and clinical characteristics

Compared to Profile 1 respondents (the reference group), those of Profiles 2 and 3 were 132% and 97% more likely to be women, respectively, and 131% and 134% more likely to be unemployed/retired (Table 3). Profiles 4 and 2 respectively had 173% and 142% more chances to include respondents age 65+; Profile 4 was 120% likelier than Profile 1 to include individuals in the 45–64 age group. Compared to Profile 1, Profiles 4, 2 and 3 were respectively 74%, 68% and 52% less likely to earn a household income of 80,000 + CAD, with Profiles 3 and 4 also being 60% and 44% less likely to earn 20,000–70,000 CAD.

Table 3 Associations between profiles of suicidal behaviors and quality of care received, and the respondents' sociodemographic and clinical characteristics, using multinomial logistic regression (Reference: profile 1)

Group size: *n* (%)		**Profile 1: Respondents with suicidal ideations and low quality of care**		**Profile 2: Respondents with suicidal ideations, and high continuity and regularity of recovery-oriented care**		**Profile 3: Respondents with suicide attempts, more unmet needs, but receiving more intensive care**		**Profile 4: Respondents with suicidal plans and low quality of care**	
		229 (40.25%)		**129 (22.67%)**		**124 (21.79%)**		**87 (15.29%)**	
		%	**RR**	**%.**	**RR**	**%.**	**RR**	**%**	**RR**
Respondent sociodemographic characteristics (measured at index date)									
Sex	Men	54.59	---	34.11	---	37.90	---	49.43	---
	Women	45.41	---	65.89	**2.32***	62.10	**1.97***	50.57	1.23
Age group (years)	12–24	24.45	---	14.73	---	21.77	---	12.64	---
	25–44	31.00	---	33.33	1.79	29.84	1.08	33.33	2.08
	45–64	32.31	---	34.11	1.75	39.52	1.37	36.78	**2.20***
	65+	12.23	---	17.83	**2.42***	8.87	0.81	17.24	**2.73***
Single (including separated, divorced, widowed)		73.80	---	79.07	1.34	71.77	0.90	74.71	1.05
Education level (*N* = 565)	Less than secondary education	26.99	---	24.03	---	30.89	---	25.29	---
	Secondary education	19.47	---	20.93	1.21	19.51	0.88	27.59	1.51
	Post-secondary education	53.54	---	55.04	1.15	49.59	0.81	47.13	0.94
Unemployed or retired		29.26	---	48.84	**2.31***	49.19	**2.34***	36.78	1.41
Household income (Can$) (*N* = 566)	0–19,999	18.50	---	25.58	---	34.96	---	32.18	---
	20,000–79,999	59.03	---	64.34	0.79	44.72	**0.40***	57.47	**0.56***
	80,000+	22.47	---	10.08	**0.32***	20.33	**0.48***	10.34	**0.26***
Food insecurity (*N* = 535)		28.84	---	26.23	0.88	39.32	1.60	46.91	**2.18***
Types of residential areas	Urban (> 100,000)	44.10	---	44.96	---	35.48	---	48.28	---
	Semi-urban (10,000 to 100,000)	30.13	---	25.58	0.83	31.45	1.30	28.74	0.87
	Rural (< 10,000)	25.76	---	29.46	1.12	33.06	1.60	22.99	0.82
Respondent clinical characteristics (measured over the 12 months preceding index date, or other as specified)									
Principal mental disorders (MDs)	No MDs	55.46	---	20.93	---	9.68	---	42.53	---
	Serious MDs	0.87	---	16.28	**49.39***	29.84	**195.79***	6.90	**10.30***
	Common MDs	37.99	---	61.24	**4.27***	57.26	**8.64***	45.98	1.58
	Substance-related disorders (SRDs) only	5.68	---	1.55	0.72	3.23	3.26	4.60	1.06

Table 3 (continued)

Group size: *n* (%)	Profile 1: Respondents with suicidal ideations and low quality of care		Profile 2: Respondents with suicidal ideations, and high continuity and regularity of recovery-oriented care		Profile 3: Respondents with suicide attempts, more unmet needs, but receiving more intensive care		Profile 4: Respondents with suicidal plans and low quality of care	
	229 (40.25%)		129 (22.67%)		124 (21.79%)		87 (15.29%)	
	%	RR	%.	RR	%.	RR	%	RR
Prior episodes of MDs, including SRDs (measured from 1996 to principal MD diagnosis, including a 3-year clearance period without any MDs)	15.28	---	32.56	**2.68***	32.26	**2.64***	20.69	1.45
Co-occurring MDs-SRDs	4.37	---	10.85	**2.67***	21.77	**6.10***	10.34	2.53
Chronic physical illnesses	21.83	---	43.41	**2.75***	41.94	**2.59***	29.89	1.53
Obesity ($N=517$)	19.32	---	30.00	**1.79***	22.12	1.19	12.99	0.62
High perceived level of stress in daily life/work ($N=567$)	35.37	---	32.03	**2.50***	44.35	**2.73***	38.37	1.06

* P-value < 0.05. RR = risk ratio from bivariate multinomial logistic regression

Profile 4 had 118% more risk than Profile 1 of reporting food insecurity.

Compared to Profile 1, Profiles 3, 2 and 4 were respectively 195, 48 and nine times more likely to have serious MDs. Profiles 3 and 2 respectively had eight and three times more risk to have common MDs, five times and 167% more risk of co-occurring MDs-SRDs, 164% and 168% more risk to have prior MD episodes, 159% and 175% more risk of chronic physical illnesses, and 173% and 150% more risk of reporting a high perceived level of stress in daily life/work. Profile 2 was 79% more likely than Profile 1 to suffer from obesity.

Associations between profiles and outcomes

Compared to Profile 1, the risk of using acute care was seven times higher in Profiles 4 and 3, and six times higher in Profile 2 (Table 4). Risk of bad or poor perceived physical/MH conditions were two times higher in Profile 3, 164% higher in Profile 4, and 143% higher in Profile 2. And compared to Profile 1, quality of life was 10% lower in Profile 3, 12% lower in Profile 2, and 14% lower in Profile 4.

Discussion

This study identified four profiles of individuals with suicidal behaviors and of quality of outpatient care received, and associated these profiles with other patient characteristics and outcomes. The percentage of respondents reporting suicidal behaviors over the 12-month period was lower in this cohort (2,7%) than in the 2015–2019 U.S. National Survey on Drug Use and Heath (4.3%) [55] or than the commonly cited international ratio stating that 1 out of 20 people exhibit suicidal behaviors [3]. The lower rate of prevalence found in this study could be due to the fact it included more individuals without MDs or SRDs (36%), as well as older populations. The four respondent profiles identified here differed significantly, especially Profile 1 (the reference group), which was much different than Profile 3. Accounting for 63% of the cohort, Profiles 1 and 2 reported suicidal ideations only, while Profile 3 mostly reported suicide attempts (60%) and Profile 4, mainly suicidal plans (61%). Studies estimate that about 30% of individuals with suicidal ideations will attempt suicide, generally in the year of the first onset of suicidal ideations [56]. This is quite similar to the 37% we found – when including suicidal plans. Profiles 1 and 4 received low outpatient quality of care compared to Profiles 2 and 3. A previous systematic review [57] found that a majority of individuals with suicidal behaviors do not seek help – similar to the 56% found in our study; that systemic review also found that stigma surrounding suicide and MDs, high self-reliance, low perceived needs for treatment and lack of social support are key barriers in seeking help for suicidality. Another study [58] reports

Table 4 Associations between profiles of suicidal behaviors and quality of care received, and the respondents' outcomes, using multinomial regression (Reference: profile 1)

Group size: n (%)	Profile 1: Respondents with suicidal ideations and low quality of care		Profile 2: Respondents with suicidal ideations, and high continuity and regularity of recovery-oriented care		Profile 3: Respondents with suicide attempts, more unmet needs, but receiving more intensive care		Profile 4: Respondents with suicidal plans and low quality of care	
	229 (40.25%)		129 (22.67%)		124 (21.79%)		87 (15.29%)	
	%/SD.	RR	%/SD.	RR	%/SD.	RR	%/SD.	RR
Death (measured over the 3 months following index date)	0	---	0		0		0	
Acute care use for mental health (MH) reasons (measured over the 3 months following index date)	0.87	---	5.43	**6.51***	6.45	**7.83***	6.9	**8.41***
Bad or poor perceived physical/MH conditions (measured in general on a standard day at index date)	34.93	---	56.59	**2.43***	62.90	**3.16***	58.62	**2.64***
Quality of life (mean/SD. – /10) (measured in general on a standard day at index date)	6.53/2.14		5.91/2.29	**0.88***	6.03/2.06	**0.90***	5.80/2.51	**0.86***

* P-value < 0.05. RR = risk ratio from multinomial regression adjusted for sex and age

that individuals who died by suicide without receiving MH services were mainly younger or older men residing in rural areas, who were less likely to have MDs, showed prior suicidal behaviors, and were generally in contact with health services.

Compared to other profiles, Profile 1 mostly stood out due to low quality of outpatient care, but its patients reached the best outcomes probably because of better social and clinical conditions. None of the Profile 1 respondents had planned or attempted suicide in the year prior, and very few reported prior suicide attempts or needs for care in relation to suicidal behaviors – similar in that to Profile 2. Profile 1 also included more men – men are known to attempt suicide less often than women, but are more likely to succeed (die) when they do [13]. Profile 1 also included more employed individuals with better household income, which might contribute to the reduction of their perceived daily life/work stress and food insecurity. A majority of Profile 1 respondents did not have any MDs or SRDs (55%), and few had prior MD episodes (15%), co-occurring MDs-SRDs (4%), or chronic physical illnesses (22%). It is a known fact that individuals who don't have MDs are less likely to receive MH services for suicidal behaviors [58], which may explain the low quality of care reported in Profile 1. Men are also known to use less healthcare services than women, and often as a last resort, perhaps because they fear stigmatization and usualy have less social support [56]. The lower proportion of chronic physical illnesses among Profile 1 respondents was likely due to their younger age. Though other studies found that individuals with less risk factors enjoy better perceived health conditions and quality of life [19, 25], about a third of Profile 1 respondents perceived their health conditions as poor or bad, and their quality-of-life ratio, though the best of all profiles, was still quite low (6.5/10). To prevent deteriorating conditions in Profile 1 individuals, and as roughly half of them did not get any MH care, community outreach strategies [59] and preventive care [60] might be suggested. Internet-based self-help interventions could also be better promoted [61]. Since most Profile 1 respondents had access to a family physician or a usual MH clinician, collaborative care might also be strengthened, as it has been shown to be effective in reducing suicidal ideations [62, 63].

Unlike those of Profile 1, individuals in Profile 3 received intensive MH care (65% got 11 + MH care episodes per year) but had the second worst outcomes, likely due to poor social and health conditions. All Profile 3 respondents reported suicide attempts (60%) or suicidal plans (40%), with roughly half having attempted suicide during their lifetime and showing needs for care; a quarter of them also declared previous acute care use for suicidal behaviors. Those respondents were the most affected by MDs and co-occurring MDs-SRDs, showed high perceived levels of stress in daily life/work, and a third of them had serious MDs. They were second worst in the number of prior MD episodes, chronic physical illnesses and obesity. Previous studies show that individuals who attempt suicide report more severe health conditions, especially MDs and stressful life events [64], and seek more MH care in response to their substantial needs [57]. These factors may explain why Profile 3 reported the second worst outcomes and the poorest perceived physical/MH conditions (63% with poor or bad conditions). Additionally, Profile 3 had the most respondents who were unemployed or retired, and who earned 0–19,999 CAD (roughly a third) – all known risk factors associated with lower quality of life [65, 66]. Cognitive or dialectical behavioral therapy [67, 68] might be recommended to reduce suicide attempts or plans in Profile 3. Since

intensity of care was elevated in this profile, care adequation might be increased and monitored better in response to these patients' needs. Programs such as assertive community treatment [69] or integrated primary and MH care [70] might be recommended to increase continuity of care among Profile 3.

Like those of Profile 1, Profile 4 individuals reported low quality of care. However, their situation was more concerning as the majority of them harbored suicidal plans and over one third had attempted suicide in the year prior – another third reported suicide attempts in their lifetime. The low quality of care in Profile 4 could be explained by negative experiences with services, stigma, or poor accessibility of services [58], which seem plausible as Profile 4 respondents received the least recovery-oriented care and had less access to private insurance – which may have hindered their access to psychotherapy, considering that in Quebec psychologists mainly work in private practice [71]. The fact that close to half of them did not have an MD diagnosis might partly explain the low quality of MH care they received – or their underuse of MH services due to underdiagnosed MDs or SRDs. Profile 4 also included more older individuals who are at higher risk of not being diagnosed with an MD [72], especially if they have chronic physical illnesses. This context explained why Profile 4 respondents had the worst outcomes, including the highest acute care use for MH reasons, a lower quality of life, and the second worst perceived physical/MH conditions. EDs are often used when individuals don't have usual care or access to MH care [73], as is the case in Profile 4 respondents, who had the least access to a family physician or other usual MH clinicians. Lower income and food insecurity among these individuals may also have contributed to their low quality of life – a previous study linked food insecurity to a decrease in physical and MH conditions [74]. As in Profile 1, community outreach strategies [59] and more thorough suicidal behavior detection in EDs and primary care may be promoted for Profile 4 patients, who should also be referred to appropriate services like crisis and suicide prevention centers. Improving access to outpatient services is a key issue to prevent suicide among Profile 4. Cognitive and dialectical behavioral therapy [67, 68] might also be suggested, as in Profile 3.

Profile 2, like Profile 1, included individuals who only had suicidal ideations, however it differed from Profile 1 in that its respondents received high continuity and regularity of recovery-oriented care, but showed worse outcomes – though better than Profiles 3 and 4. Profile 2 reported the second worst social and health conditions after Profile 3 (e.g., unemployed/retired, MDs, MDs-SRDs, chronic physical illnesses), which may explain the high level of care they received and their better outcomes compared to Profiles 3 and 4. Profile 2 included the most respondents who dealt with obesity – about a third of them had this condition known for its detrimental effect on health [75]. Of all profiles, Profile 2 received the best care: the fact that continuity and regularity of care, and recovery-oriented care are key quality-of-care dimensions may have protected them against worse outcomes. The poorer overall conditions of these patients may have forced them to seek more help. Profile 2 had the highest proportion of women, who are known to consult in MH care more than men [76]. As in Profile 3, programs like assertive community treatment [69], intensive case management [77], and integrated primary and MH care [70] might be recommended to increase continuity of care among Profile 2 patients.

Limitations

This study has several limitations. First, CCHS data were self-reported, possibly introducing memory-recall and social desirability biases, and were based on one multiple-choice question instead of standardized scales. SRDs in medical records are also quite underdiagnosed [78]. Though the CCHS proxy of 5 + drinks several times a week was accounted for, it may not indicate significant enough impairment. Second, information regarding prior suicidal ideations and plans over lifetime, reasons why individuals with suicidal behaviors did not use care, and key services like crisis or suicide prevention centers were not available in the study's database. Third, the selection of quality-of-care indicators and outcomes was limited, especially since the three-month period after index date was too short for measuring death and data were only available up to March 31, 2017. Fourth, the quality of life and perceived physical/MH conditions were measured at index date, but unlike death and acute care they were not assessed for the 3 months following each interview – though it was unlikely the patients' conditions would have changed significantly over a 3-month period; perhaps future research could investigate this further. Fifth, several variables were determined based on the empirical distribution of groups, primarily due to the limited availability of established quality-of-care benchmarks – underscoring the need to prioritize this area in future research. Sixth, the study results can't be generalizable to healthcare systems that don't have universal coverage for the most vulnerable. Finally, comparisons with other typology studies were limited due to the original nature of this study.

Conclusion

This study identified four profiles, including a majority of respondents who had suicidal ideations only (Profiles 1 and 2: 63%) and low quality of care received (Profiles 1 and 4: 56%), and a minority (Profile 4: 15%) who mostly reported suicidal plans (or attempts). Study findings

showed that the profiles who received a better quality of care were more affected by worse social and health conditions (Profiles 3 and 2), especially MDs – an important result, as it shows the Quebec health system is particularly responsive to patients with worse conditions. However, findings also showed that the quality of services may be improved substantially to prevent suicide, with outreach strategies reinforced for Profiles 4 and 1. Even though Profile 3 received more intensive care, it showed the second-worst outcomes after Profile 4, which may indicate that care didn't sufficiently meet the needs of these patients; enhancing care would be justified in their case, considering the seriousness of their social and health issues and their high rates of suicide attempts or plans. Services could better protect patients against adverse outcomes if they more closely matched their needs and the severity of their conditions – Profiles 3 and 2 patients, especially, would benefit from more continuous follow-up care. A greater integration of researchers, decision makers, clinical teams and experts on suicidal behaviors might also be recommended to facilitate the deployment of the care strategies suggested in this study, this in order to adequately respond to the diversified needs of patients with suicidal behaviors.

Abbreviations

CCHS	Canadian Community Health Survey
ED	Emergency department
GP	General practitioner
LCA	Latent class analysis
MD	Mental disorder
MH	Mental health
SRD	Substance-related disorder

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12913-026-14055-7.

Supplementary Material 1

Acknowledgements

We gratefully acknowledge the support of the Canadian Institutes of Health Research (CIHR), and the Quebec SUPPORT Unit (Support for People and Patient-Oriented Research and Trials) for their agreement to access the data of the TorSaDe cohort and their technical help, and especially to Drs. Alain Vanasse and Anaïs Lacasse.

Author contributions

MJF: funding acquisition; project administration; supervision; conceptualization; methodology, writing – original draft. ZC: methodology; formal analysis; writing – original draft. GG: writing – original draft. XM: revision – final draft.

Funding

This study was funded by the Canadian Institutes of Health Research (CIHR, grant number: 452752). The sponsors had no role in the study design or in the collection, analysis, and interpretation of data, in writing the report or in the decision to submit this paper for publication.

Data availability

In accordance with the applicable ethics regulations for the province of Quebec, the principal investigator is responsible for keeping data confidential.

Declarations

Ethicals approval and consent to participate

The Quebec Commission for Access to Information granted access to the province's databases. The Research Ethics Board (REB) of the *Centre intégré universitaire de santé et de services sociaux (CIUSSS) de l'Ouest-de-l'Île-de-Montréal* approved the study protocol. As the study used health administrative databases, the informed consent of patients is deemed unnecessary according to national regulations (Quebec's Act respecting access to documents held by public bodies and the protection of personal information, R.L.R.Q, c. A-2.1, and the Act respecting health services and social services, R.L.R.Q., c. S-4.2.).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Received: 5 May 2025 / Accepted: 12 January 2026
Published online: 17 January 2026

References

1. World Health Organization. Suicide worldwide in 2019. Global Health Estimates. In. Geneva: World Health Organization; 2021.
2. World Health Organization. Preventing suicide: A global imperative. Geneva: World Health Organization; 2014.
3. SAMHSA. Key Substance use and mental health indicators in the United States. Results from the 2020 National Survey on Drug Use and Health. In., vol. (HHS Publication No. PEP21-07-01-003, NSDUH Series H-56). Rockville,M'D: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. 2021. Retrieved from https://www.samhsa.gov/data/.
4. Klonsky ED, May AM, Saffer BY. Suicide, suicide attempts, and suicidal ideation. Annu Rev Clin Psychol. 2016;12:307–30. https://doi.org/10.1146/annurev-clinpsy-021815-093204.
5. Rens E, Portzky G, Morrens M, Dom G, Van den Broeck K, Gijzen M. An exploration of suicidal ideation and attempts, and care use and unmet need among suicide-ideators in a Belgian population study. BMC Public Health. 2023;23(1):1741. https://doi.org/10.1186/s12889-023-16630-7.
6. Simon GE, Yarborough BJ, Rossom RC, Lawrence JM, Lynch FL, Waitzfelder BE, Ahmedani BK, Shortreed SM. Self-reported suicidal ideation as a predictor of suicidal behavior among outpatients with diagnoses of psychotic disorders. Psychiatr Serv. 2019;70(3):176–83. https://doi.org/10.1176/appi.ps.201800381.
7. Leza L, Haro B, Lopez-Goni JJ, Fernandez-Montalvo J. Substance use disorder and lifetime suicidal behaviour: A scoping review. Psychiatry Res. 2024;334:115830. https://doi.org/10.1016/j.psychres.2024.115830.
8. Lundberg J, Cars T, Lampa E, Ekholm Selling K, Leval A, Gannedahl A, Sjalin M, Bjorkholm C, Hellner C. Determinants and outcomes of suicidal behavior among patients with major depressive disorder. JAMA Psychiatry. 2023;80(12):1218–25. https://doi.org/10.1001/jamapsychiatry.2023.2833.
9. Kye SY, Park K. Suicidal ideation and suicidal attempts among adults with chronic diseases: A cross-sectional study. Compr Psychiatry. 2017;73:160–7. https://doi.org/10.1016/j.comppsych.2016.12.001.
10. Hamilton JE, Desai PV, Hoot NR, Gearing RE, Jeong S, Meyer TD, Soares JC, Begley CE. Factors associated with the likelihood of hospitalization following emergency department visits for behavioral health conditions. Acad Emerg M. 2016;23(11):1257–66. https://doi.org/10.1111/acem.13044.
11. Stene-Larsen K, Reneflot A. Contact with primary and mental health care prior to suicide: A systematic review of the literature from 2000 to 2017. Scand J Public Health. 2019;47(1):9–17. https://doi.org/10.1177/1403494817746274.
12. Stanley IH, Hom MA, Joiner TE. Mental health service use among adults with suicide Ideation, Plans, or attempts: results from a National survey. Psychiatr Serv. 2015;66(12):1296–302. https://doi.org/10.1176/appi.ps.201400593.

13. Bommersbach TJ, Rosenheck RA, Petrakis IL, Rhee TG. Why are women more likely to attempt suicide than men? Analysis of lifetime suicide attempts among US adults in a nationally representative sample. J Affect Disord. 2022;311:157–64. https://doi.org/10.1016/j.jad.2022.05.096.
14. Berny LM, Tanner-Smith EE. Differential predictors of suicidal ideation and suicide attempts: internalizing disorders and substance use in a clinical sample of adolescents. J Dual Diagn. 2022;18(1):59–69. https://doi.org/10.1080/15504263.2021.2016343.
15. Mars B, Heron J, Klonsky ED, Moran P, O'Connor RC, Tilling K, Wilkinson P, Gunnell D. What distinguishes adolescents with suicidal thoughts from those who have attempted suicide? A population-based birth cohort study. J Child Psychol. 2019;60(1):91–9. https://doi.org/10.1111/jcpp.12878.
16. Subramaniam M, Abdin E, Seow EL, Picco L, Vaingankar JA, Chong SA. Suicidal ideation, suicidal plan and suicidal attempts among those with major depressive disorder. Ann Acad Med Singap. 2014;43(8):412–21.
17. Gentil L, Huynh C, Grenier G, Fleury MJ. Predictors of emergency department visits for suicidal ideation and suicide attempt. Psychiatry Res. 2020;285:112805. https://doi.org/10.1016/j.psychres.2020.112805.
18. Diamond GS, Herres JL, Krauthamer Ewing ES, Atte TO, Scott SW, Wintersteen MB, Gallop RJ. Comprehensive screening for suicide risk in primary care. Am J Prev Med. 2017;53(1):48–54. https://doi.org/10.1016/j.amepre.2017.02.020.
19. Diez-Gomez A, Perez-Albeniz A, Sebastian-Enesco C, Fonseca-Pedrero E. Suicidal behavior in adolescents: A latent class analysis. Int J Environ Res Public Health. 2020;17(8). https://doi.org/10.3390/ijerph17082820.
20. Tairi T, Milojev P, Zilikis N. Clinical profiles among Greek adolescent suicide attempters. Crisis. 2018;39(5):335–43. https://doi.org/10.1027/0227-5910/a000506.
21. Hamza CA, Willoughby T. Nonsuicidal self-injury and suicidal behavior: a latent class analysis among young adults. PLoS ONE. 2013;8(3):e59955. https://doi.org/10.1371/journal.pone.0059955.
22. Marraccini ME, Brick LA, O'Neill JC, Weyandt LL, Buchanan AL. Self-Injurious thoughts and behaviors among college students: A latent class analysis. Arch Suicide Res. 2021;25(4):731–50. https://doi.org/10.1080/13811118.2020.1746942.
23. Xiao Y, Bi K, Yip PS, Cerel J, Brown TT, Peng Y, Pathak J, Mann JJ. Decoding suicide decedent profiles and signs of suicidal intent using latent class analysis. JAMA Psychiatry. 2024;81(6):595–605. https://doi.org/10.1001/jamapsychiatry.2024.0171.
24. King CA, Brent D, Grupp-Phelan J, Shenoi R, Page K, Mahabee-Gittens EM, Chernick LS, Melzer-Lange M, Rea M, McGuire TC, et al. Five profiles of adolescents at elevated risk for suicide attempts: differences in mental health service use. J Am Acad Child Adolesc Psychiatry. 2020; 59(9):1058–1068 e1055 https://doi.org/10.1016/j.jaac.2019.10.015
25. Wastler HM, Mengda Y, Pan X, Bornheimer LA, Moe AM, Breitborde NJK. Trajectories of suicidal risk among individuals with first-episode psychosis: relationship to recovery and symptoms. Psychiatry Res. 2024;338:115978. https://doi.org/10.1016/j.psychres.2024.115978.
26. Fleury MJ, Cao Z, Armoon B, Grenier G, Lesage A. Profiles of patients using emergency departments or hospitalized for suicidal behaviors. Suicide Life Threat Behav. 2022;52(5):943–62. https://doi.org/10.1111/sltb.12892.
27. Silva JP. Health services for substance use disorders: challenges and future perspectives. BMC Health Serv Res. 2023;23(1):1063. https://doi.org/10.1186/s12913-023-10072-y.
28. Health Canada. What we heard. Strengthening Canada's approach to substance use issues. In. Ottawa, Ontario: Health Canada; 2019.
29. Fontanella CA, Warner LA, Steelesmith DL, Brock G, Bridge JA, Campo JV. Association of timely outpatient mental health services for youths after psychiatric hospitalization with risk of death by suicide. JAMA Netw Open. 2020;3(8):e2012887. https://doi.org/10.1001/jamanetworkopen.2020.12887.
30. Arnon S, Shahar G, Brunstein Klomek A. Continuity of care in suicide prevention: current status and future directions. Front Public Health. 2023;11:1266717. https://doi.org/10.3389/fpubh.2023.1266717.
31. SAMHSA. Key substance use and mental health indicators in the united States. Results from the 2018 National survey on drug use. and Health: National findings; 2019.
32. Fleury MJ, Cao Z, Grenier G, Huynh C. Profiles of quality of outpatient care use, associated sociodemographic and clinical characteristics, and adverse outcomes among patients with substance-related disorders. Subst Abuse Treat Prev Policy. 2023;18(1):5. https://doi.org/10.1186/s13011-022-00511-0.
33. Waldemar AK, Arnfred SM, Petersen L, Korsbek L. Recovery-Oriented practice in mental health inpatient settings: A literature review. Psychiatr Serv. 2016;67(6):596–602. https://doi.org/10.1176/appi.ps.201400469.
34. RAMQ. Rapport annuel de gestion, 2016–2017. Québec: Régie de l'assurance maladie du Québec; 2017.
35. Vandenbroucke JP, von Elm E, Altman DG, Gotzsche PC, Mulrow CD, Pocock SJ, Poole C, Schlesselman JJ, Egger M, Strobe Initiative. Strengthening the reporting of observational studies in epidemiology (STROBE): explanation and elaboration. Epidemiology. 2007;18(6):805–35. https://doi.org/10.1097/EDE.0b013e3181577511.
36. Kiran T, Daneshvarfard M, Wang R, Beyer A, Kay J, Breton M, Brown-Shreves D, Condon A, Green ME, Hedden L, et al. Public experiences and perspectives of primary care in canada: results from a cross-sectional survey. CMAJ. 2024;196(19):E646–56. https://doi.org/10.1503/cmaj.231372.
37. Carter R, Quesnel-Vallee A, Plante C, Gamache P, Levesque JF. Effect of family medicine groups on visits to the emergency department among diabetic patients in Quebec between 2000 and 2011: a population-based segmented regression analysis. BMC Fam Pract. 2016;17:23. https://doi.org/10.1186/s12875-016-0422-2.
38. Breslau N, Reeb KG. Continuity of care in a university-based practice. J Med Educ. 1975;50(10):965–9. https://doi.org/10.1097/00001888-197510000-00006.
39. Ionescu-Ittu R, McCusker J, Ciampi A, Vadeboncoeur AM, Roberge D, Larouche D, Verdon J, Pineault R. Continuity of primary care and emergency department utilization among elderly people. CMAJ. 2007;177(11):1362–8. https://doi.org/10.1503/cmaj.061615.
40. Moorin RE, Youens D, Preen DB, Wright CM. The association between general practitioner regularity of care and 'high use' hospitalisation. BMC Health Serv Res. 2020;20(1):915. https://doi.org/10.1186/s12913-020-05718-0.
41. Winsper C, Crawford-Docherty A, Weich S, Fenton SJ, Singh SP. How do recovery-oriented interventions contribute to personal mental health recovery? A systematic review and logic model. Clin Psychol Rev. 2020;76:101815. https://doi.org/10.1016/j.cpr.2020.101815.
42. Bartram M. Income-based inequities in access to mental health services in Canada. Can J Public Health. 2019;110(4):395–403. https://doi.org/10.17269/s41997-019-00204-5.
43. Silva MF Jr. Social determinants of mental health: a review of the evidence. Eur J Psychiat. 2016;30(4):Zaragoza oct./dic. 2016.
44. Hovenkamp-Hermelink JHM, Jeronimus BF, Myroniuk S, Riese H, Schoevers RA. Predictors of persistence of anxiety disorders across the lifespan: a systematic review. Lancet Psychiatry. 2021;8(5):428–43. https://doi.org/10.1016/S2215-0366(20)30433-8.
45. Kanny D, Naimi TS, Liu Y, Lu H, Brewer RD. Annual total binge drinks consumed by U.S. Adults, 2015. Am J Prev Med. 2018;54(4):486–96. https://doi.org/10.1016/j.amepre.2017.12.021.
46. Linden-Carmichael AN, Russell MA, Lanza ST. Flexibly modeling alcohol use disorder risk: how many drinks should we count? Psychol Addict Behav. 2019;33(1):50–7. https://doi.org/10.1037/adb0000431.
47. Simard M, Sirois C, Candas B. Validation of the combined comorbidity index of Charlson and elixhauser to predict 30-Day mortality across ICD-9 and ICD-10. Med Care. 2018;56(5):441–7. https://doi.org/10.1097/MLR.0000000000000905.
48. Sun BC, Hsia RY, Weiss RE, Zingmond D, Liang LJ, Han W, McCreath H, Asch SM. Effect of emergency department crowding on outcomes of admitted patients. Ann Emerg Med. 2013;61(6):605–e611606. https://doi.org/10.1016/j.annemergmed.2012.10.026.
49. Becker MA, Boaz TL, Andel R, Hafner S. Risk of early rehospitalization for Non-Behavioral health conditions among adult medicaid beneficiaries with severe mental illness or substance use disorders. J Behav Health Serv Res. 2017;44(1):113–21. https://doi.org/10.1007/s11414-016-9516-9.
50. Wardrop R, Crilly J, Ranse J, Chaboyer W, Vulnerability. A concept synthesis and its application to the emergency department. Int J Nurs. 2021;54:100936. https://doi.org/10.1016/j.ienj.2020.100936.
51. Flanagan S, Damery S, Combes G. The effectiveness of integrated care interventions in improving patient quality of life (QoL) for patients with chronic conditions. An overview of the systematic review evidence. Health Qual Life Outcomes. 2017;15(1):188. https://doi.org/10.1186/s12955-017-0765-y.
52. Paul P, Hakobyan M, Valtonen H. The association between self-perceived health status and satisfaction with healthcare services: evidence from Armenia. BMC Health Serv Res. 2016;16:67. https://doi.org/10.1186/s12913-016-1309-6.
53. Ali BB, Massmoudi Y. K-means clustering based on gower similarity coefficient: A comparative study. In: 5th International Conference on Modeling, Simulation and Applied Optimization (ICMSAO). 2013. (Reprint Edition).

54. Dziak JJ, Lanza ST, Tan X. Effect size, statistical power and sample size requirements for the bootstrap likelihood ratio test in latent class analysis. Struct Equ Model. 2014;21(4):534–52. https://doi.org/10.1080/10705511.2014.919819.
55. Ivey-Stephenson AZ, Crosby AE, Hoening JM, Gyawali S, Parik-Lee E, Hedden SL. Suicidal thoughs and behaviors among adults aged ≥ 18 years– United States, 2015–2019. MMWR. 2022;71(1):1–19.
56. Richardson C, Robb KA, McManus S, O'Connor RC. Psychosocial factors that distinguish between men and women who have suicidal thoughts and attempt suicide: findings from a National probability sample of adults. Psychol Med. 2023;53(7):3133–41. https://doi.org/10.1017/S0033291721005195.
57. Han J, Batterham PJ, Calear AL, Randall R. Factors influencing professional Help-Seeking for suicidality. Crisis. 2018;39(3):175–96. https://doi.org/10.1027/0227-5910/a000485.
58. Tang S, Reily NM, Arena AF, Batterham PJ, Calear AL, Carter GL, Mackinnon AJ, Christensen H. People who die by suicide without receiving mental health services: A systematic review. Front Public Health. 2021;9:736948. https://doi.org/10.3389/fpubh.2021.736948.
59. Wahlbeck K, Cresswell-Smith J, Haaramo P, Parkkonen J. Interventions to mitigate the effects of poverty and inequality on mental health. Soc Psychiatry Psychiatr Epidemiol. 2017;52(5):505–14. https://doi.org/10.1007/s00127-017-1370-4.
60. Zalsman G, Hawton K, Wasserman D, van Heeringen K, Arensman E, Sarchiapone M, Carli V, Hoschl C, Barzilay R, Balazs J, et al. Suicide prevention strategies revisited: 10-year systematic review. Lancet Psychiatry. 2016;3(7):646–59. https://doi.org/10.1016/S2215-0366(16)30030-X.
61. Buscher R, Torok M, Terhorst Y, Sander L. Internet-based cognitive behavioral therapy to reduce suicidal ideation: a systematic review and meta-analysis. JAMA Netw Open. 2020;3(4):e203933. https://doi.org/10.1001/jamanetworkopen.2020.3933.
62. Grigoroglou C, van der Feltz-Cornelis C, Hodkinson A, Coventry PA, Zghebi SS, Kontopantelis E, Bower P, Lovell K, Gilbody S, Waheed W, et al. Effectiveness of collaborative care in reducing suicidal ideation: an individual participant data meta-analysis. Gen Hosp Psychiatry. 2021;71:27–35. https://doi.org/10.1016/j.genhosppsych.2021.04.004.
63. Khazanov GK, Wolk CB, Lorenc E, Candon M, Pieri MF, Oslin DW, Press MJ, Anderson E, Famiglio E, Jager-Hyman S. Change in suicidal ideation, depression, and anxiety following collaborative care in the community. BMC Prim Care. 2024;25(1):241. https://doi.org/10.1186/s12875-024-02494-2.
64. Liu CH, Stevens C, Wong SHM, Yasui M, Chen JA. The prevalence and predictors of mental health diagnoses and suicide among U.S. College students: implications for addressing disparities in service use. Depress Anxiety. 2019;36(1):8–17. https://doi.org/10.1002/da.22830.
65. Norstrom F, Waenerlund AK, Lindholm L, Nygren R, Sahlen KG, Brydsten A. Does unemployment contribute to poorer health-related quality of life among Swedish adults? BMC Public Health. 2019;19(1):457. https://doi.org/10.1186/s12889-019-6825-y.
66. Zhang S, Xiang W. Income gradient in health-related quality of life - the role of social networking time. Int J Equity Health. 2019;18(1):44. https://doi.org/10.1186/s12939-019-0942-1.
67. Mendez-Bustos P, Calati R, Rubio-Ramirez F, Olie E, Courtet P, Lopez-Castroman J. Effectiveness of psychotherapy on suicidal risk: A systematic review of observational studies. Front Psychol. 2019;10:277. https://doi.org/10.3389/fpsyg.2019.00277.
68. DeCou CR, Comtois KA, Landes SJ. Dialectical behavior therapy is effective for the treatment of suicidal behavior: A Meta-Analysis. Behav Ther. 2019;50(1):60–72. https://doi.org/10.1016/j.beth.2018.03.009.
69. Penzenstadler L, Soares C, Anci E, Molodynski A, Khazaal Y. Effect of assertive community treatment for patients with substance use disorder: A systematic review. Eur Addict Res. 2019;25(2):56–67. https://doi.org/10.1159/000496742.
70. Ramanuj P, Ferenchik E, Docherty M, Spaeth-Rublee B, Pincus HA. Evolving models of integrated behavioral health and primary care. Curr Psychiatry Rep. 2019;21(1):4. https://doi.org/10.1007/s11920-019-0985-4.
71. Institut National d'Excellence en Santé et en Services Sociaux I. Volet II—Analyse des modalités et des conditions d'accès aux services de psychothérapie pour Le traitement des adultes Atteints de troubles dépressifs et anxieux. Rapport rédigé par Alvine Fansi et Cédric Jehanno, 33 p. Avis Sur l'accès équitable aux services de psychothérapie. Qc: Gouvernement du Québec,: edn. Québec; 2015.
72. Zenebe Y, Akele B, Necho MWS. Prevalence and determinants of depression among old age: a systematic review and meta-analysis. Ann Gen Psychiatry. 2021;20(1):55. https://doi.org/10.1186/s12991-021-00375-x.
73. Fleury MJ, Ferland F, Farand L, Grenier G, Imboua A, Gaida F. Reasons explaining high emergency department use in patients with mental illnesses: different staff perspectives. Int J Ment Health Nurs 2024 https://doi.org/10.1111/inm.13442
74. Bhandari S, Campbell JA, Walker RJ, Thorgerson A, Dawson AZ, Egede LE. Dose response relationship between food insecurity and quality of life in united States adults: 2016–2017. Health Qual Life Outcomes. 2023;21(1):21. https://doi.org/10.1186/s12955-023-02103-3.
75. Hruby A, Manson JE, Qi L, Malik VS, Rimm EB, Sun Q, Willett WC, Hu FB. Determinants and consequences of obesity. Am J Public Health. 2016;106(9):1656–62. https://doi.org/10.2105/AJPH.2016.303326.
76. Wang Y, Hunt K, Nazareth I, Freemantle N, Petersen I. Do men consult less than women? An analysis of routinely collected UK general practice data. BMJ Open. 2013;3(8):e003320. https://doi.org/10.1136/bmjopen-2013-003320.
77. Vanderplasschen W, Rapp RC, De Maeyer J, Van Den Noortgate W. A Meta-Analysis of the efficacy of case management for substance use disorders: A recovery perspective. Front Psychiatry. 2019;10:186. https://doi.org/10.3389/fpsyt.2019.00186.
78. Huynh C, Kisely S, Rochette L, Pelletier E, Jutras-Aswad D, Larocque A, Fleury MJ, Lesage A. Using administrative health data to estimate prevalence and mortality rates of alcohol and other substance-related disorders for surveillance purposes. Drug Alcohol Rev. 2021. https://doi.org/10.1111/dar.13235.

Publisher's note