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FULL-LENGTH REPORT

Profiles of service use among patients with gambling disorders

MARIE-JOSÉE FLEURY[1,2*], ZHIRONG CAO[2], GUY GRENIER[2], FRANCINE FERLAND[3] and NADINE BANCHETTE-MARTIN[4]

[1] Department of Psychiatry, McGill University, Montreal, Quebec, Canada

[2] Douglas Hospital Research Centre, Montreal, Quebec, Canada

[3] School of Social Work, Laval University, Service de recherche en dépendance Centre intégré de santé et de service sociaux de la Capitale-Nationale et du Centre de santé et de service sociaux de Chaudière-Appalaches, Quebec City, Quebec, Canada

[4] Service de recherche en dépendance Centre intégré de santé et de service sociaux de la Capitale-Nationale et du Centre de santé et de service sociaux de Chaudière-Appalaches, Quebec City, Quebec, Canada

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ABSTRACT

Background and aims: Service use data among patients with gambling disorder (GD) remains scarce. This exploratory study aimed to identify the service use profiles associated with social and health conditions, gambling games or chronicity (≥ 5 years), and subsequent adverse outcomes. *Methods:* In 2012–2013, 2,311 patients (72% men, 45 years [SD: 13.60]) were recruited from addiction treatment centers in Quebec (Canada); their administrative data were merged with provincial health and education data (1979–2022). Latent class analysis identified profiles related to GD treatment received (2009–2021) and other service use in the 12 months before index date (last GD records). Multiple multinomial logistic and Cox regressions examined associations with patient conditions and subsequent outcomes over 12 months (acute care, suicidal behaviors, death). *Results:* Profile 2 patients (35% of sample) exhibited the most chronic GD, and high use of GD and other services. Profile 4 (20%) reported the worst social and health conditions, received no GD treatment, and showed moderate use of other services. Profile 1 (15%) included patients with the best conditions, but moderate GD treatment and low use of other services. Mostly composed of patients aged 35+ years, Profile 3 (30%) received low GD treatment but high general practitioner care. Patients in Profiles 4 and 2 reported the worst conditions and highest rates of adverse outcomes – although Profile 2 received the best care overall. *Conclusion:* GD treatment and other care may be strengthened and better coordinated. Screening, motivational interventions, and referrals to care could be consolidated. Profiles 4 and 2 may benefit from more long-term care.

KEYWORDS

gambling disorder, service use, help-seeking, latent class analysis, profiles, adverse outcomes

INTRODUCTION

Gambling disorder (GD) was officially recognized in 2013 as an addictive disorder in the DSM-V (American Psychiatric Association, 2013), and later in 2019 in the International Classification of Diseases, 11th Revision (ICD-11) (World Health Organization, 2019). Since then, problem gambling, including GD and other harmful gambling behaviors affecting a person's life (e.g., employment, relationships) (Griffiths, 2016), has been considered an important public concern (Abbott, 2020; Wardle et al., 2024), especially with the rise in online gambling since the COVID-19 pandemic (Lyn et al., 2025). Adverse outcomes linked to GD include financial losses, indebtedness, vocational or family disruptions (with risk of

*Corresponding author.
E-mail: flemar@douglas.mcgill.ca

violence) (Moreira, Azeredo, & Dias, 2023), poverty, homelessness, and criminality (Matheson, Devotta, Wendaferew, & Pedersen, 2014). Among youths, it may lead to behavioral problems and delinquency (Dowling et al., 2018). GD is also highly co-occurring with mental disorders (MDs) and substance-related disorders (SRDs: substance use or induced, intoxication, withdrawal), sometimes leading to chronic physical illnesses (Schluterman, Billioux, Brown, Al-Hadidi, & Tracy, 2025). GD shows a chronicity equal to or greater than that of SRDs (Gooding, Williams, & Williams, 2022).

In spite of these adverse outcomes, less than 10% of individuals with problem gambling seek help for their gambling behaviors, often only when driven by crisis or after incurring severe harm (Loy, Grûne, Samuelson, & Kraus, 2018). These patients are known to prefer being treated through primary care, or through psychiatric or addiction services (Hakansson & Ford, 2019). However, general practitioners (GPs) refer most patients with GD to specialized care, as few feel confident in treating them directly (Tatar, Iammatteo, Brodeur, & Fleury, 2025). Problem gamblers have been found to use primary mental health care, inpatient hospital services, and psychological services at about 2, 5 and 8 times the rates of the general population, respectively (Cowlishaw & Kessler, 2016). Help-seeking individuals usually present poorer social and clinical conditions, with highly problematic gambling habits (Roberts, Rogers, Sharman, Melendez-Torres, & Cowlishaw, 2021). However, they likely do not constitute a homogeneous population, as they have different conditions and needs, and may use different types of GD treatment or other care. Service use may also vary according to the specific games patients report problems with. Understanding the diverse profiles of service use among patients with GD may help prioritize and tailor interventions.

Though several typologies of problem gambling have been published, most are based on individual sociodemographic and clinical characteristics – including MDs (Aonso-Diego, Macia, Montero, & Estevez, 2024), impulsivity (Araguay et al., 2018), psychopathology and personality traits (Jimenez-Murcia et al., 2013; Myrseth, Pallesen, Molde, Havik, & Notelaers, 2016). Some studies focus on gambling games and/or gambling severity, especially among youths (Boldero, Bell, & Moore, 2010; Challet-Bouju et al., 2015; Lloyd et al., 2010; Studer et al., 2016), with one focusing exclusively on a clinical population receiving specialized GD treatment – this study generated four profiles based on psychopathology (Alvarez-Moya et al., 2010). Furthermore, three gambler profiles were identified based on the pathways model: these were labeled "behaviorally conditioned", "emotionally vulnerable", and "antisocial, impulsive" (Blaszczynski & Nower, 2002). To our knowledge, no previous typology has focused on service use, taking into account quality-of-care indicators such as the continuity, regularity, and intensity of care patients received. No typology has used a large clinical population with comprehensive longitudinal administrative data, or associated gambler profiles with adverse outcomes. This study thus aimed to identify profiles of patients receiving GD treatments and other services, associate these profiles with the patients' social and health conditions, GD chronicity and gambling activities, and subsequently link these profiles to adverse outcomes.

METHODS

Study design and participants

This study is based on an original cohort of 23,637 patients aged 12+ years, who were treated in addiction treatment centers ($N = 14/16$) from April 1, 2012 to March 31, 2013. As the main public specialized providers of services for addiction in Quebec (Canada), these centers offer a range of residential and outpatient treatments for GD and SRDs, primarily through individual and group therapy. Access to treatment in these centers is available via self-referral, court orders, or referral from other providers. Patient data were gathered from the administrative database of these centers (SIC-SRD) from 2009 to 2021, and subsequently merged with the Quebec Health Insurance Plan Registry and the Quebec Ministry of Health and Social Services databases, with data from 2006 to 2022, and with the public education database from 1979 to 2022. For this specific study, patients needed to be identified with GD in the period spanning from 2009 to 2021. For patients recorded as having more than one GD treatment episode during this period, the end date of the last recorded episode was considered the patient's "index date". Patient records also needed to specify which gambling games they played (e.g., slot machines) and in what setting (i.e., casino, online, bar, gambling hall). However, in this study, the gambling settings were used only for imputing missing data related to gambling games. Out of the initial cohort of 23,637 patients, 3,676 had GD and 2,311 reported data on their gambling games or settings of choice. In the final cohort of 2,311 patients, 72% were men with a mean age of 45 years [SD: 13.60] (see Table 1 for a full description of the cohort).

Study data sources

Besides identifying GD and SRDs, data collected from addiction center databases (SIC-SRD) included the patients' sociodemographic characteristics and various information on treatment received in those centers. The other provincial health and social databases included: the Health Insurance Registry (FIPA, demographic information), the Physician Claims Database (RAMQ), the Hospital Inpatient Database (MED-ECHO), the Emergency Department (ED) Service Use Database (BDCU), the Community Healthcare Centers Service Use Database (I-CLSC – mostly public psychosocial services), and the Death Registry (RED). The education database was only used to specify each patient's education level. The RAMQ integrates billing systems for nearly all Quebec physicians – only about 6% work outside the public system (Régie de l'assurance maladie du Québec, 2017). In Quebec/Canada, healthcare and education are mainly public, respectively covering medical and some psychosocial services, and high school and post-secondary education. Data were merged for each patient and year using a unique

Table 1. Characteristics of patients with a gambling disorder (GD) (N = 2,311)

		n	%
Treatment of GD in addiction treatment centers (measured from 2009 to index date)			
Number of GD treatment episodes[a]	No GD treatment	467	20.21
	1	919	39.77
	2+	925	40.02
Number of months between GD treatment episodes (mean/SD)[a]		7.70	14.63
Number of months between GD treatment episodes (median/IQR)[a]		0	10.37
Average number of GD outpatient treatments per episode[a]	No GD treatment	467	20.21
	≤11	1,217	52.66
	12+	627	27.13
Average duration of GD outpatient treatments per episode[a]	No GD treatment	467	20.21
	≤90 days	845	36.56
	>90 days	999	43.23
Residential GD treatment at least one time (vs. no residential GD treatment)[a]		142	6.14
Group-based GD treatment at least one time (vs. individual GD treatment)[a]		410	17.74
High rate of self-referral to GD treatment (≥67% of the time) (vs. <67%)[a]		1,316	56.95
High rate of GD treatment dropout (≥51% of the time) (vs. <51%)[a]		1,042	45.09
Other outpatient care received (measured within 12 months before index date)			
Access to a usual general practitioner (GP) (vs. no usual GP)[b,c]		1,472	63.70
Access to a usual psychiatrist (vs. no usual psychiatrist)[b]		384	16.62
High continuity of physician care (≥80%) (vs. <80%)[b,c]		1,046	45.26
Psychosocial interventions in community healthcare centers (vs. no access to those services)[c]		858	37.13
Intensity of outpatient care other than for GD treatment (mean/SD)[a,b,c]		13.52	22.49
Intensity of outpatient care other than for GD treatment (median/IQR)[a,b,c]		7	14
High regularity of follow-up with any provider (services received in all 4 of 3-month periods) (vs. less than 2 services received, or services received in only 1, 2 or 3 of the 3-month periods)[a,b,c]		1,029	44.51
Patient sociodemographic characteristics (measured at index year, the last year available or other as specified)			
Sex[d]	Women	655	28.34
	Men	1,656	71.66
Age group (years)[d]	14–34[#]	570	24.66
	35–59	1,384	59.89
	60+	357	15.45
Age (years) (mean/SD)[d]		45.44	13.60
Education level (measured from 1979 to index date)[*e]	Less than secondary education	36.21	(33.94, 38.48)
	Secondary diploma	43.88	(41.63, 46.12)
	Post-secondary education	19.91	(18.26, 21.57)
Unemployed/retired (vs. studying/working)[a]		1,264	54.69
Living alone (including single parent) (vs. in couple/married)[a]		1,028	48.26
Living in more materially deprived areas (indexes 4–5 or areas not assigned) (vs. indexes 1–3)[d]		1,178	50.97
Living in more socially deprived areas (indexes 4–5 or areas not assigned) (vs. indexes 1–3)[d]		1,400	60.58
History of homelessness (measured from 2009 to 2010 to index date) (vs. no history of homelessness)[a,g]		394	17.05
Criminal history (measured from 2009 to 2010 to index date) (vs. no criminal history)[a]		410	17.74
Patient clinical characteristics (measured within 3 years before index date)			
Substance-related disorders (SRDs) (vs. no SRDs)[a,b,f,g]		1,363	58.98
Mental disorders (MDs) (vs. no MDs)[**b,f,g]		1,515	65.56
Serious MDs (including personality disorders) (vs. no serious MDs)[**b,f,g]		736	31.85
Common MDs (vs. no common MDs)[**b,f,g]		1,347	58.29
Chronic physical illnesses (vs. no chronic physical illnesses)[**b,f,g]		1,080	46.73
Severe chronic physical illnesses (3+) (vs. <3)[**b,f,g]		267	11.55
GD characteristics (measured from 2009 to 2010 to index date)			
Chronic GD (≥5 years) (vs. <5)[a,b,g]		802	34.70
Gambling games		**%**	**95% CI**
Lottery/bingo/keno (vs. no lottery/bingo/keno)[*a]		32.77	(30.15, 35.38)
Slot machines/video lottery (vs. no slot machines/video lottery)[*a]		48.26	(45.59, 50.93)
Table games (vs. no table games)[*,a]		30.28	(28.26, 32.30)
Sports betting/other games (vs. no sports betting/other games)[*a]		17.20	(15.03, 19.38)

(continued)

Table 1. Continued

	n	%
Adverse outcomes (measured within 12 months after index date)	*n*	%
Frequent emergency department (ED) use for any reason (3+ visits/year) (vs. <3 visits/year)[b,f]	384	16.62
Hospitalization for any reason (vs. no hospitalization)[g]	423	18.30
Suicidal behaviors (suicide attempt/ideation) (vs. no suicidal behavior)[f,g]	130	5.63
Death for any cause (vs. no death)[a,b,f,g,h***]	24	1.04

[#]There were 17 patients (0.7%) aged under 18: age 14 ($N = 7$); aged 15 ($N = 3$); aged 16 ($N = 3$) and aged 17 ($N = 4$). No patients were age 12 or 13 in this specific study.
[##]Few patients were retired ($N = 161$, 6.97%), justifying their integration with unemployed patients.
[*]Analyses employed multiple imputation with chained equations (20 imputations), auxiliary variables including: age, sex, material and social deprivation, history of homelessness, number of years with GD, having SRDs or serious MDs (including personality disorders).
[**]To have a MD, patients had to have one MD diagnosis only from psychiatrists or during a hospitalization, but at least two MD diagnoses with a GP within the 3-year period. This case definition also applied for either serious or common MDs. In total, 1,881 patients (81.39%) had MDs (1,515; 65.56%) or SRDs (1,363; 58.98%), with 997 (43.14%) having co-occurring MDs-SRDs. Specifically, 304 patients (13.15%) had schizophrenia spectrum and other psychotic disorders, 338 (14.63%) had bipolar disorders, and 472 (20.42%) had personality disorders. To have a chronic physical illness, patients also had to have at least two diagnoses of the same issues.
[a]*Système d'information sur la clientèle des services de réadaptation en dépendance* (SIC-SRD, Addiction Treatment Center Database, including GD and SRD diagnoses based on standardized instruments); [b]*Régie de l'assurance maladie du Québec* (RAMQ, Physician Claims Database); [c]*Système d'information permettant la gestion de l'information clinique et administrative dans le domaine de la santé et des services sociaux* (I-CLSC, Registry on Psychosocial Interventions in Community Healthcare Centers); [d]*Fichier d'inscription des personnes assurées* (FIPA, Health Insurance Registry); [e]Education Database; [f]*Banque de données communes des urgences* (BDCU, ED Database); [g]*Maintenance et exploitation des données pour l'étude de la clientèle hospitalière* (MED-ECHO, Hospital Inpatient and Day Surgery database); [h]Death Registry (RED).

patient identifier integrating variables (e.g., diagnoses) across several databases (Table 1 footnotes). Access to databases was granted by the Quebec Commission for Access to Information. Study protocol was approved by the ethics review board of a health organization.

Study variables

Service use profiles among patients with GD integrated: GD treatment received in addiction treatment centers, measured from 2009 to 2021 (a 12-year period), and public outpatient care, measured over the 12 months preceding the patient's index date. The start and end dates of each care episode or admission for GD (or SRD) treatment were recorded for each patient in the SIC-SRD. GD treatment received specifically included eight covariates: (1) number of GD treatment episodes; (2) average intervals between GD care episodes; (3) number and (4) duration of GD outpatient treatments per episode; (5) residential GD treatment (yes/no); (6) group GD treatment; and high rates of (7) self-referral to or (8) dropout from GD treatment. Group treatment was differentiated from individual treatment. Self-referral to GD treatment and dropout rates served as positive or negative proxies for patient motivation, evaluated as "high" when self-referrals happened ≥ 67% of the time, and dropouts ≥ 51% of the time. These thresholds and others in the study (e.g., ≤ 90 treatment days) were determined through empirical distribution.

Other outpatient care included six covariates: access to (1) a usual GP or (2) a psychiatrist; (3) high continuity of physician care; (4) psychosocial interventions in community healthcare centers; (5) mean intensity of outpatient care other than GD treatment; and (6) high regularity of care with any provider. "Usual GP" referred to physicians providing ongoing care over time (Fleury, Rochette, et al., 2025). Continuity of physician care was measured with the Usual Provider Continuity Index (Breslau & Reeb, 1975), which describes the proportion of outpatient consultations with usual physicians out of all physicians consulted – a score of ≥ 0.80 reflects high care continuity (Ionescu-Ittu et al., 2007). Intensity of outpatient care included the mean number of treatments received from GPs, psychiatrists, and community healthcare centers – the latter being Quebec's main public psychosocial service providers. Regularity of care assessed whether services were received in each 3-month period of the year; regularity was considered "high" when services were used in all four quarters (Moorin, Youens, Preen, & Wright, 2020).

Covariates associated with service use profiles included the patient's sociodemographic and clinical characteristics, and GD characteristics, selected based on previous service use or GD research (Challet-Bouju et al., 2025; Fleury, Cao, Grenier, Huynh, & Meng, 2025). Sociodemographic characteristics integrated eight covariates: (1) sex; (2) age group (e.g., 14–34 years); (3) education level (e.g., secondary diploma); (4) unemployed/retired; (5) living alone (including single parent); and (6) living in more materially or socially deprived areas – all measured at index date; (7) criminal history and (8) history of homelessness (yes/no) were measured from 2009 to index date. "Unemployed/retired" and "living alone" were contrasted to "studying/working" and "in couple/married", respectively. Using the smallest dissemination areas where patients resided, the Material Deprivation Index considered employment ratios,

average income, and level of education, while the Social Deprivation Index measured the proportion of individuals who were single, living alone, or single parents (Pampalon, Hamel, Gamache, & Raymond, 2009). Both indexes were divided in quintiles, contrasting areas that were least (1–3) and most deprived (4–5 or unassigned areas like homelessness).

Clinical and GD characteristics were both measured for the three years preceding the index date. Clinical characteristics included four covariates: (1) SRDs (alcohol/drugs); MDs, divided into (2) serious MDs and (3) common MDs; and (4) chronic physical illnesses, including their severity. GD characteristics encompassed five covariates: (1) chronic GD; gambling games categorized as: (2) lottery/bingo/keno, (3) slot machines/video lottery, (4) table games, (5) sports betting/other games. Diagnostic codes were provided by the ICD Ninth or Tenth Revisions – though GD was only available in ICD-10 in Quebec (Supplementary material 1). Serious MDs integrated schizophrenia spectrum and other psychotic disorders, bipolar disorders, and personality disorders. Common MDs primarily included anxiety and depressive disorders. The chronic physical illnesses covariate was based on an adapted version of the Charlson and Elixhauser indices, with 3+ used as benchmark for severity (Simard, Sirois, & Candas, 2018). Chronic GD was defined as having GD for at least five years – a common benchmark for recovery (White, 2012). GD was documented based on physician records, the Addiction Severity Index (Bergeron, Landry, Ishak, Vaugeois, & Trepanier, 1992) or the Global Appraisal of Individual Needs scales (Dennis, White, Titus, & Unsicker, 2008) – both scales featured in the SIC-SRD.

Measured over 12 months post-index, adverse outcomes included four covariates: (1) frequent ED use (3+ visits) and (2) hospitalization for any reason, (3) suicidal behaviors (suicide attempt or ideation), and (4) death for any cause. Routinely tracked in administrative databases, these outcomes are indicative of patients with multiple unmet needs, especially if ED use and hospitalization could be avoided (Armoon, Grenier, Cao, Huynh, & Fleury, 2021).

Data analyses

Descriptive analyses were produced: percentages for categorical variables, mean/standard deviation (SD) or median/interquartile range (IQR) for continuous variables. At < 1% missing values, complete case analysis was used – except for education level and gambling games/settings, where missing data were 17 and 34%, respectively. This justified using multiple imputation via chained equations (20 imputations – Table 1 footnotes) (Van Buuren & Groothuis-Oudshoorn, 2011), and sensitivity analyses. The latter compared the imputed results to raw data for these variables for each profile, yielding similar findings (Supplementary material 2). Latent class analysis (LCA) was performed to identify service use profiles. Membership probabilities were computed from estimated model parameters (Hagernaars & McCutcheon, 2009). The Akaike Information Criterion (AIC) (Akaike, 1987), Bayesian Information Criterion (BIC) (Schwarz, 1978), and entropy values (Celeux & Soromenho, 1996) were calculated to identify the optimal number of classes. Multiple multinomial logistic regressions were conducted to examine associations between profiles of service use membership and covariates, adjusting for the remaining significant covariables listed in Table 1. Cox proportional hazards regressions were also produced to assess associations between those profiles and adverse outcomes (acute care, suicide behaviors, death), adjusting for age and sex. Relative risk ratios (RRRs), hazard ratios (HRs), and 95% confidence intervals (CIs) were reported. LCA was performed using SAS 9.4, other analyses with Stata 18.

Ethics

The Quebec Commission for Access to Information granted access to the province databases, and the Research Ethics Board (REB) of the Centre intégré universitaire de santé et de services sociaux (CIUSSS) du Centre-sud-de-l'Île-de-Montréal approved the study protocol. As the study used health administrative databases, informed consent from 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).

RESULTS

Service use profiles (GD treatment and other outpatient care)

Considering the lowest BIC and AIC values were observed in the four-class solution, and the entropy value was 0.9 (exceeding the 0.8 threshold that indicates good separation and minimal profile overlap), the four-class model was selected (BIC: 3-class = 4,988; 4-class = 4,233; 5-class = 4,486; AIC: 3-class = 4,684; 4-class = 3,825; 5-class = 3,974).

Profile 1 (15% of the sample) was labeled: "Moderate GD treatment, low use of other services." In this profile, 35% of patients received 2+ GD treatment episodes, 84% ≤ 11 GD interventions, and for 67% treatments spanned ≤ 90 days (Table 2). In Profile 1, 7 and 15% of patients used residential and group GD treatment, respectively; 80% reported high self-referral rates and 59%, high dropout rates. Profile 1 patients received no physician care, and only 10% received psychosocial interventions. Outpatient care intensity and regularity were low: on average, patients received only one non-GD intervention, and only 2% showed high care regularity.

Profile 2 (35%) was labeled: "High GD treatment and use of other services." All Profile 2 patients received 2+ GD treatment episodes, with a mean of 19 months between episodes; 40% obtained 12+ GD interventions, and 60% had treatment durations of > 90 days; 11% used residential treatment and 27%, group treatment, while 69 and 74% showed high self-referral and dropout rates, respectively. Among Profile 2 patients, 81% received care by a usual GP,

Table 2. Service use profiles among patients with a gambling disorder (GD) (N = 2,311)

		Profile 1: moderate GD treatment, low use of other services	Profile 2: high GD treatment and use of other services	Profile 3: low GD treatment, high GP care	Profile 4: no GD treatment, moderate use of other services
Group size: *n* (%)		343 (14.84%)	804 (34.79%)	697 (30.16%)	467 (20.21%)
		%	%	%	%
Treatment of GD in addiction treatment centers (measured from 2009 to index date)					
Number of GD treatment episodes	No GD treatment	0.00	0.00	0.00	100.00
	1	64.72	0.00	100.00	0.00
	2+	35.28	100.00	0.00	0.00
Number of months between GD care episodes (mean/SD)		6.94 (13.44)	19.18 (17.92)	0.00 (0.00)	0.00 (0.00)
Average number of GD outpatient treatments per episode	No GD treatment	0.00	0.00	0.00	100.00
	≤11	83.67	60.07	64.13	0.00
	12+	16.33	39.93	35.87	0.00
Average duration of GD outpatient treatments per episode	No GD treatment	0.00	0.00	0.00	100.00
	≤90 days	67.35	40.42	41.46	0.00
	>90 days	32.65	59.58	58.54	0.00
Residential GD treatment at least one time (vs. no residential GD treatment)		7.00	10.95	4.30	0.00
Group-based GD treatment at least one time (vs. individual GD treatment)		14.58	26.99	0.00	0.00
High rate of self-referral to GD treatment (≥67% of the time) (vs. <67%)		79.59	69.28	69.73	0.00
High rate of GD treatment dropout (≥51% of the time) (vs. <51%)		58.60	73.51	35.87	0.00
Other outpatient care received (measured within 12 months before index date)					
Access to a usual general practitioner (GP) (vs. no usual GP)		0.00	80.72	81.64	54.39
Access to a psychiatrist (vs. no usual psychiatrist)		0.00	24.13	15.93	16.92
High continuity of physician care (≥80%) (vs. <80%)		0.00	59.33	58.54	34.48
Psychosocial interventions in community healthcare centers (vs. no access to those services)		10.20	45.02	37.73	42.40
Intensity of outpatient care other than for GD treatment (mean/SD)		1.29 (2.04)	16.59 (25.44)	12.69 (17.68)	18.48 (27.74)
High regularity of follow-up with any provider (services received in all 4 of 3-month periods) (vs. less than 2 services received, or services received in only 1, 2 or 3 of the 3-month periods)		2.33	61.44	53.52	32.98

24% by a psychiatrist, 59% obtained high physician care continuity, 45% benefitted from psychosocial interventions, and 61% received high care regularity. They ranked highest in most variables, and second-highest (N = 17) in intensity of care for conditions other than GD.

Profile 3 (30%) was labeled: "Low GD treatment, high GP care." All Profile 3 patients received one GD treatment episode. Overall, 64% received ≤ 11 GD treatments, which for 59% of them lasted ≤ 90 days. Self-referral rate was 70%, and dropout rate 36%; 82% had access to a usual GP, while high continuity of physician care was at 59% and high care regularity at 54%.

Profile 4 (20%) was labeled: "No GD treatment, moderate use of other services". While no patient in this profile received GD treatments, they received on average 18 other (non-GD) interventions, the highest outpatient care intensity among all profiles. They ranked second in care received by a psychiatrist (17%) and psychosocial interventions (42%).

Table 3. Associations between patient profiles and covariables using multiple multinomial logistic regression (Profile 2 as reference group) (N = 2,311 patients with gambling disorder (GD))

Profile 2: as the reference group		Profile 2: high GD treatment and use of other services		Profile 1: moderate GD treatment, low use of other services		Profile 3: low GD treatment, high general practitioner (GP) care		Profile 4: no GD treatment, moderate use of other services	
Group size: *n* (%)		804 (34.79%)		343 (14.84%)		697 (30.16%)		467 (20.21%)	
		%	RRR	%	RRR (95% CI)	%	RRR (95% CI)	%	RRR (95% CI)
Patient sociodemographic characteristics (measured at index year, the last year available or other as specified)									
Sex	Women (ref.)	34.33	–	15.16	–	33.43	–	20.13	–
	Men	65.67	–	84.84	**2.06 (1.42, 2.97)***	66.57	1.02 (0.79, 1.31)	79.87	1.16 (0.82, 1.65)
Age group (years)	14–34 (ref.)	13.81	–	33.82	–	22.53	–	39.83	–
	35–59	64.55	–	58.02	**0.68 (0.46, 0.98)***	59.11	0.78 (0.57, 1.10)	54.39	**0.66 (0.45, 0.96)***
	60+	21.64	–	8.16	**0.45 (0.30, 0.68)***	18.36	0.87 (0.62, 1.22)	5.78	**0.39 (0.25, 0.60)***
Unemployed/retired (ref.: studying/working)		61.82	–	36.15	**0.57 (0.41, 0.78)***	50.36	**0.72 (0.56, 0.92)***	62.53	0.91 (0.66, 1.27)
Living in more socially deprived areas (index 4–5 or areas not assigned) (vs. indexes 1–3)		63.06	–	54.81	0.94 (0.70, 1.25)	56.67	0.95 (0.75, 1.19)	66.38	**1.40 (1.03, 1.90)***
History of homelessness (measured from 2009 to 10 to the index dates) (vs. no history of homelessness)		15.67	–	12.54	**1.58 (1.02, 2.46)***	12.91	1.22 (0.87, 1.71)	28.9	**2.24 (1.52, 3.31)***
Criminal history (measured from 2009 to 10 to the index dates) (vs. no criminal history)		13.31	–	13.99	1.26 (0.82, 1.92)	11.48	1.06 (0.75, 1.51)	37.47	**2.88 (1.99, 4.19)***
Patient clinical characteristics (measured within 3 years before index date)									
Substance-related disorders (SRDs) (ref.: no SRDs)		53.36	–	43.44	0.86 (0.63, 1.17)	48.64	0.96 (0.75, 1.23)	95.50	**14.33 (8.68, 23.66)***
Serious mental disorders (MDs) (including personality disorders) (ref.: no serious MDs)		31.34	–	5.83	**0.38 (0.25, 0.59)***	21.52	0.81 (0.62, 1.05)	32.12	1.01 (0.71, 1.42)
Common MDs (ref.: no common MDs)		74.13	–	33.82	**0.31 (0.22, 0.42)***	66.71	0.97 (0.75, 1.25)	66.60	**0.55 (0.39, 0.76)***
Severe chronic physical illnesses (3+) (ref.: <3)		16.17	–	2.92	**0.41 (0.20, 0.82)***	9.47	0.74 (0.52, 1.07)	13.06	1.22 (0.77, 1.95)
GD characteristics (measured from 2009 to 2010 to index date)									
Chronic GD (≥5 years) (ref.: <5 years)		66.17	–	27.11	**0.26 (0.19, 0.35)***	21.09	**0.15 (0.12, 0.19)***	6.42	**0.04 (0.02, 0.06)***
Lottery/bingo/keno (vs. no lottery/bingo/keno)		41.52	–	24.43	0.67 (0.42, 1.01)	32.83	0.81 (0.60, 1.09)	23.73	**0.39 (0.23, 0.67)***
Slot machines/video lottery (vs. no sports betting/other games)		54.28	–	46.94	0.86 (0.59, 1.24)	49.33	0.95 (0.69, 1.29)	37.26	**0.51 (0.33, 0.79)***
Table games (vs. no table games)		29.68	–	38.25	0.83 (0.54, 1.27)	31.10	0.82 (0.56, 1.20)	24.24	**0.43 (0.24, 0.76)***

*Indicates significant differences at $p < 0.05$. Relative risk ratios (RRRs) are derived from a multinomial logistic regression model adjusted for the remaining significant covariables listed in the table. All variables included in Table 1 were tested. However, only variables significantly associated with Profile 2 are presented here.

Associations between service use profiles and covariates (patient sociodemographic, clinical, and GD characteristics)

Considering that, of the four profiles, Profile 2 (High GD treatment and use of other services) received the highest level of care and included the most patients (35%), it was selected as the reference group. Compared with Profile 2 patients, those of Profiles 1 (Moderate GD treatment, low use of other services), 3 (Low GD treatment, high GP care) and 4 (No GD treatment, moderate use of other services) were 74, 85 and 96% less likely to have chronic GD (≥ 5 years), respectively (Table 3). Compared to Profile 2, patients in Profiles 1 and 4 were 32 and 34% less likely to be aged 35–59; 55 and 61% less likely to be aged 60+; and 69 and 45% less likely to have common MDs, while they were 58% and 1.24 times more likely to have a history of homelessness. Profiles 1 and 3 patients were respectively 43 and 28% less likely to be unemployed/retired than those of Profile 2. Again, compared to Profile 2, Profile 1 patients were 1.06 times more likely to be men, showed 62% less risk of having serious MDs, and were 59% less likely to have severe chronic physical illnesses. Profile 4 patients were 40% more likely to live in socially deprived areas, and 1.88 and 13.3 times more likely to have a criminal history or SRDs, respectively than Profile 2. They were also respectively 61, 49 and 57% less likely than Profile 2 to report problems with lottery/bingo/keno, slot machines/video lottery, and table games.

Associations between profiles and adverse outcomes in the 12 following months

Compared to the reference group (Profile 2, High GD treatment and use of other services), patients in Profiles 1 (Moderate GD treatment, low use of other services) and 3 (Low GD treatment, high GP care) were respectively 62 and 45% less likely to be frequent ED users, while those from Profile 4 (No GD treatment, moderate use of other services) were 34% more at risk in this respect (Table 4). Profiles 1 and 3 also reported 60 and 28% less risk of being hospitalized than Profile 2. Profile 1 patients were 59% less likely to be affected by suicidal behaviors, while those of Profile 4 had a 58% higher risk than Profile 2 in this respect. There were no differences in the risk of death between the profiles.

DISCUSSION

To our knowledge, this study is the first to identify service use profiles among help-seeking patients with GD. Between 2009 and 2021, most patients (40%) were treated for GD only once, while 20% were never treated. About half of GD treatment episodes included few (≤ 11) interventions or ended in patients dropping out – this even though one-third of them were affected by GD for over five years. Non-intensive GD treatments and elevated GD dropout rates do seem to be the norm, in our study as in others

Table 4. Associations between patient profiles and adverse outcomes (N = 2,311 patients with gambling disorder (GD)) (measured within 12 months after index date)

Profile 2: as the reference group	Profile 2: high GD treatment and use of other services		Profile 1: moderate GD treatment, low use of other services		Profile 3: low GD treatment, high general practitioner (GP) care		Profile 4: no GD treatment, moderate use of other services	
Group size: *n* (%)	804 (34.79%)		343 (14.84%)		697 (30.16%)		467 (20.21%)	
	%	HR	%	HR (95% CI)	%	HR (95% CI)	%	HR (95% CI)
Frequent emergency department (ED) use for any reason (3+ visits/year) (vs. <3 visits/year)	20.02	–	7.87	**0.38 (0.25, 0.58)***	11.48	**0.55 (0.42, 0.72)***	24.84	**1.34 (1.04, 1.72)***
Hospitalization for any reason (vs. no hospitalization)	22.39	–	8.16	**0.40 (0.26, 0.59)***	16.07	**0.72 (0.57, 0.91)***	22.06	1.24 (0.96, 1.60)
Suicidal behaviors (suicide attempt/ideation) (vs. no suicidal behavior)*	5.72	–	2.62	**0.41 (0.20, 0.84)***	4.02	0.67 (0.42, 1.08)	10.06	**1.58 (1.02, 2.44)***
Death for any cause (vs. no death)	1.99		0.29	0.22 (0.03, 1.66)	0.86	0.48 (0.19, 1.22)	0.21	0.19 (0.02 1.51)

*Indicates significant differences at $p < 0.05$. Hazard ratios (HRs) are derived from Cox regression models adjusted for age and sex.

Hansen, Mejldal, & Nielsen, 2020). Patients in our study thus received limited GD care for their gambling behaviors, in line with earlier research Bijker, Booth, Merkouris, Dowling, & Rodda, 2022), but here examined in a clinical population over a 12-year period. Moreover, less than half the patients received continuous and regular care for issues other than GD, with a slightly higher number (64%) having access to a usual GP – care intensity, however, was quite high and varied among users in a one-year period.

In our study, most patients had MDs (66%) or SRDs (59%), thus leading to frequent use of non-GD services. A previous meta-analysis (Dowling et al., 2015) reported psychiatric comorbidity ranging from 37 to 94%, with a mean of 75% among treatment-seeking individuals with problem gambling. Though our study found similar results, the low quality of care reported here seemed at odds with these patients' vulnerability: high prevalence of chronic physical illnesses (47%), history of homelessness or criminality (17–18%), isolation and deprivation (about 50%). These factors probably contributed to the high rates of adverse outcomes observed in our study, notably acute care use and suicidal behaviors. Two-thirds of our cohort were men, which was consistent with results typically found among individuals with problem gambling (Tran et al., 2024). However, patient profiles differed significantly in terms of service use and associated conditions.

It was interesting to find that Profile 2 (High GD treatment and use of other services, the reference group) was the largest group in the cohort (35%) and received the best care. All Profile 2 patients received 2+ GD treatment episodes, including more intensive and longer outpatient and residential treatments, perhaps due to a greater prevalence of chronic GD (27%) than in other profiles. The social and clinical conditions of Profile 2 patients were more favorable overall than Profile 4, but less than Profile 1; they were similar to those of Profile 3, except for the number of unemployed/retired individuals, which was higher in Profile 2. These characteristics may explain why Profile 2 patients used more non-GD services. Though they received extensive overall care, they experienced the highest GD treatment dropout rate, possibly because they lacked motivation to be treated. This profile also received the most group-based GD treatment (27%), which future research might explore as a potential factor in their higher dropout rate. Profile 2 patients reported worse outcomes than those of Profiles 1 and 3 – though better than Profile 4 –, but were similar to Profile 3 in terms of suicidal behaviors, and to Profile 4 for hospitalization rates.

Profile 4 (No GD treatment, moderate use of other services) differed the most from Profile 2. Compared to the latter, Profile 4 included fewer patients affected by chronic GD or reporting problems with lottery/bingo/keno, slot machines/video lottery or table games, but more younger individuals – though similar to Profile 1 in that respect. The fact that GD may be more recent and players younger may explain why Profile 4 patients received no GD treatment. They also exhibited the poorest conditions: more socially deprived, history of criminality and/or homelessness, and they were 13 times more likely to have SRDs (almost all had SRDs) than Profile 2 patients. These worse conditions might explain why, after Profile 2, Profile 4 received the greatest amount of specialized MD services from psychiatrist and community healthcare centers. Yet, they received the second-worst access to GP care and continuity and regularity of care. Conversely, they exhibited the most intensive outpatient care, likely representing "high users" of services, probably with frequent visits to walk-in clinics (Tulloch, Fearon, & David, 2011). Stigma, previous negative experiences with services, or an inclination to self-manage problems may have contributed to the low quality of care they received (Moore et al., 2024). Young people and patients with SRDs are also known to use more care during crises, and to have fewer consistent caregivers (Earnshaw et al., 2019). All these conditions may explain why Profile 4 patients reported the highest rates of acute care use and suicidal behaviors, and why they were significantly higher than Profile 2 for frequent ED use and suicidal behaviors. Those variables were two to three times higher in Profile 4 than in the general population (Ivey-Stephenson et al., 2022).

Profile 1 (Moderate GD treatment, low use of other services) also differed substantially from Profile 2. It included the second-highest proportion of patients treated for GD after Profile 2. However, most of them only received one treatment episode of low intensity and duration (mainly $\leq$ 11, $\leq$ 90 days). Self-referral to GD treatment was the highest in this profile, suggesting initial motivation. Many still dropped out, but in lesser numbers than in Profile 2. Nearly one-third had chronic GD, which was still lower than in Profile 2. All these conditions may explain their moderate GD treatment levels. Profile 1 patients rarely used services for conditions other than GD, perhaps because this profile featured a higher proportion of men and young people than profile 2, groups known to use fewer health services (Earnshaw et al., 2019). Profile 1 patients also had better overall conditions than those of Profile 2, as it included less patients at risk of being unemployed/retired, with MDs, and/or with chronic physical conditions. Profile 1 characteristics may have played a protective role against adverse outcomes, as it featured the lowest acute care use and suicidal behaviors, significantly lower than Profile 2.

Profile 3 patients (Low GD treatment, high GP care) received only one episode of GD treatment, mostly of low intensity ($\leq$ 11 interventions). Aside from Profile 4, they had the lowest GD treatment dropout rate, which might reflect a greater motivation for care than patients in other profiles. Profile 3 included less patients with chronic GD and unemployed/retired individuals than Profile 2, reported the best social and clinical conditions after Profile 1, and included more older individuals – though similar in that to Profile 2. These patient characteristics might explain why they mostly received care from GPs and had the second-highest continuity and regularity of care, and justify their more favorable outcomes – only Profile 1 reported more positive outcomes. Especially, they had lower ED use and hospitalization rate compared to Profile 2.

LIMITATIONS

Some limitations should be noted. First, since we used administrative databases, data were recorded only if services were used and coding was adequately reported. Second, GD was probably underreported, as it was mostly identified in the addiction treatment database and in ICD-10, yet employed in Quebec hospitalization settings starting in 2006, and progressively by physicians in 2019 – in the ICD-9 the last digit of the 312.31 GD code was missing, and thus could not be used. Third, the study did not have data on gambling frequency or adverse outcomes such as financial losses and vocational or family disruptions, that might affect service use. Fourth, information on service use like Gamblers Anonymous, online help, crisis or suicide prevention centers, and private psychologists was not available. Fifth, considerable data were missing for the education level and gambling games/settings variables – however, multiple imputations and sensitivity analyses were conducted. Finally, findings may not be generalizable to patients who do not have GD, do not seek help, or countries with no public health insurance for vulnerable populations.

CONCLUSION

This study identified four patient profiles based on service use among a clinical population. Only one-third of patients were frequent users of GD treatments and other services (Profile 2), also reporting the most chronic GD. One-fifth of patients (Profile 4) did not receive any GD treatment during the 12-year follow-up period. This profile showed the most recent-onset GD and reported the least problems with gambling games. Overall, service use was low considering the level of vulnerability of these patients, with about half of the cohort reporting key social and/or clinical issues. Profiles featuring the most men and youths (1 and 4) also reported the lowest use of services. Patients with the worst social and clinical conditions had the most adverse outcomes – especially those of Profile 4. Even Profile 2, who received the best services, fared slightly better than Profile 4.

Study results showed that GD treatments may be significantly strengthened overall, and, for the most vulnerable (Profiles 4 and 2), coordinated with other services to respond to these patients' many unmet needs. Profiles 4 and 2 may especially benefit from more long-term care, including integrated SRD-MD treatment (Kikkert, Goudriaan, de Waal, Peen, & Dekker, 2018) or intensive case management (Penzenstadler, Machado, Thorens, Zullino, & Khazaal, 2017). Profile 1 patients may benefit from increased access to primary care, while for those of Profile 3 help may be better promoted, notably from Gamblers Anonymous or other primary care GD resources. Screening, brief treatment, and referrals to care, combined with motivational interventions (Babor et al., 2007), may also be better implemented for GD and other co-occurring issues, including strategies to prevent GD chronicity. Those interventions may be more deployed in primary (Yakovenko, Quigley, Hemmelgarn, Hodgins, & Ronksley, 2015) or acute care settings (Boudreaux et al., 2016).

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SUPPLEMENTARY DATA

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