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Profiles of Permanent Supportive Housing Residents Related to Their Housing Conditions, Service Use, and Associated Sociodemographic and Clinical Characteristics

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Abstract

As permanent supportive housing (PSH) is the main strategy promoted to reduce homelessness, understanding how PSH resident profiles may be differentiated is crucial to the optimization of PSH implementation – and a subject that hasn't been studied yet. This study identified PSH resident profiles based on their housing conditions and service use, associated with their sociodemographic and clinical characteristics. In 2020–2021, 308 PSH residents from Quebec (Canada) were interviewed, with K-means cluster analysis produced to identify profiles and subsequent analyses to compare profiles and PSH resident characteristics. Of the three profiles identified, Profiles 1 and 2 (70% of sample) showed moderate or poor housing, neighborhood, and health conditions, and moderate or high unmet care needs and service use. Besides their "moderate" conditions, Profile 1 residents (52%) reported being in PSH for more than two years and being less educated. With the "worst" conditions and high service use, Profile 2 (18%) included younger individuals, while Profile 3 (30%) showed the "best" conditions and integrated individuals with more protective determinants (e.g., few in foster care, homelessness at older age, more self-esteem), with a majority living in single-site PSH and reporting higher satisfaction with support and community-based services. Profiles 1 and 2 may be provided with more psychosocial, crisis, harm reduction, and empowerment interventions, and peer helper support. Profile 2 may benefit from more intensive and integrated care, and better housing conditions. Continuous PSH may be sustained for Profile 3, with regular monitoring of service satisfaction and met needs.

Keywords Profile · Permanent supportive housing · Unmet care needs · Service use

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Introduction

Permanent supportive housing (PSH) is the main strategy endorsed in the U.S., Canada and other Western countries to eliminate homelessness [1]. PSH is inspired by the Housing First Model [2], which offers individuals facing chronic homelessness and mental disorders (MD) immediate access to permanent housing, bypassing the need for prior treatment for MD or substance use disorders (SUD) [3]. PSH is acknowledged as the most effective approach for achieving housing stability and enhancing various outcomes for residents, especially in reducing acute care (ED and hospitalization) [4, 5]. PSH provides subsidized housing coupled with housing support, encompassing life skills, community integration coaching, and coordination with other health providers to better respond to the residents' needs [5].

PSH generally centers around two primary models: scattered-site PSH, which houses individuals in privately rented properties located all over the city, with case managers conducting home visits [6]; and single-site PSH, offering housing within a socially integrated apartment complex with on-site services [7, 8]. PSH may vary in terms of accommodations (e.g., insufficient daylight) and neighborhood quality (e.g., level of crime), factors known to influence outcomes such as wellbeing [9]. Satisfaction with services, including housing support, might also vary among PSH residents, and has been found to improve treatment outcomes [10, 11]. Considering PSH residents can face multimorbidity, they usually require intensive, diversified outpatient care to integrate into the community. But the help they receive varies depending on what resources case managers can bring, and on each resident's willingness to accept help. Over the years, the homeless population has become increasingly heterogeneous, with more youth, women, and families involved [12]. Considering the heterogeneity of housing, service provision, and homelessness characteristics, identifying PSH resident profiles may lead to more customized strategies that better respond to their varied and ever-changing needs. Using person-centered approaches like K-means clustering, which correlate specific user traits rather than variables on heterogeneous populations or subgroups, may offer effective solutions for identifying distinct profiles among PSH residents [13].

Previous studies have developed typologies for homeless individuals focusing on factors such as type of homelessness [12, 14–18]; housing stability over time [12, 14–18]; the individuals' distinct clinical characteristics [16, 17]; and frequency of emergency department (ED) use, considering adverse outcomes [15, 19]. One of those studies [20] found four profiles, one of which was comprised of recent PSH residents receiving more outpatient care that was highly satisfying, and who consequently required less acute care. Another study found seven homelessness profiles, with one including more PSH residents with no or few ED visits/year [21]. Residents living in PSH for a longer time may also differentiate from more recent PSH residents with the same conditions. However, we found no prior studies that investigate profiles of PSH residents only, aiming at differentiating them.

This study is original in that it identifies PSH resident profiles based on their housing conditions and service use patterns, including length of stay and type of PSH (scattered- or single-site), public or community-based outpatient help, and acute care use. Few studies differentiate PSH in terms of the quality of their accommodations and of their neighborhood [9]. And few previous studies have investigated links between PSH residents and unmet care needs [22], even though identifying unmet needs might help differentiate PSH resident profiles, thus making it possible to better respond to the various needs of these vulnerable populations. This study identified PSH profiles based on the residents' housing features and service use, and associated these to their sociodemographic and clinical characteristics (age, sex, social support, psychological distress, functional disability, etc.).

Understanding how PSH profiles may be differentiated is crucial in order to optimize PSH implementation, as it is the main strategy promoted to reduce homelessness. Improving the quality of housing conditions, service provision, and satisfaction for PSH residents is a key issue. This study thus aimed to identify PSH resident profiles in Quebec (Canada), based on their housing conditions, service use, and associated resident characteristics.

Methods

Study Inclusion Criteria, Setting, and Data Collection

The research investigated adults who previously were homeless and had lived in PSH for a minimum of six months, up to several years. Participants were referred from 25 PSH organizations, predominantly community organizations ($n=23$), located in Montreal (Quebec, Canada), with whom the research team maintained a strong working relationship. These were the main organizations delivering PSH in Montreal: 17 offered single-site PSH; the 8 others, scattered-site PSH. From 2015 to 2022, about 2,500 homeless individuals were housed in the Montreal area; most were men aged 30–64 with MD or SUD. The study was presented to the staff of these organizations, and to PSH residents during activities (e.g., collective meals) where the names of the interested residents were collected. Staff were asked to solicit residents to participate in the study, keeping in mind we wanted women and men who had been in PSH for various lengths of time. Staff were provided flyers with information about the study to give to residents, and information posters to be displayed in PSH common areas or in key places inside the organizations' buildings.

Data was collected from January 2020 to April 2022, except from March to October 2020 when data collection was halted due to COVID-19 restrictions. The 25 organizations referred 345 PSH residents to the research team – roughly half of all residents who were informed of the study. The team coordinator then contacted these potential participants to confirm their commitment, and to schedule interviews. Most interviews were conducted by phone using an online platform (Lime Survey), but some were done at PSH facilities, in the participant's apartment or in local cafés. With closely monitored by the research team, trained research agents conducted structured interviews that included questions on the participants' housing conditions and service use (assessed for this PSH resident typology) and on their sociodemographic and clinical characteristics, which were subsequently associated with the specific PSH resident profiles that were found. Participants deemed too disorganized or intoxicated to be interviewed were rescheduled. Participants gave their informed consent and received a modest compensation. Study ethics approval was granted by the Douglas Mental Health University Institute Ethics Committee.

Study Variables and Instruments

Supplementary File 1 provides a detailed overview of the instruments used in this study, including standardized scales. All variables were evaluated for the 12-month period preceding each interview, except for age at the first episode of homelessness, living in foster care before the age of 18, and length of residence in PSH, which were measured over the lifetime. Housing conditions included in the PSH resident typology encompassed: current PSH model of residence; length of residence in PSH (<2 vs. 2+ years); housing quality; satisfaction with case manager or community housing support; and the physical state,

level of trouble, and collective effectiveness of the neighborhood. The scattered-site PSH model provided case management [23] to meet the residents' needs, with an average of two visits/month at the housing. In the single-site model, continuous help was delivered on-site by a social intervener who managed the housing's resident support. Assistance in each model was typically accessible during regular business hours. Housing quality and satisfaction with the case manager or community housing support were both assessed using a five-point scale, with higher scores indicating greater appreciation. The physical state of the neighborhood [24] (e.g., "What do you think about the physical condition of public spaces such as parks, public squares and bus shelters?") and its level of collective effectiveness [25] (e.g., "Do you think that one could count on your neighbors to intervene when a fight breaks out in front of their home?") were evaluated on ten- and five-point scales, respectively, with higher scores indicating more favorable conditions. The level of trouble in the neighborhood [26] (e.g., "How often are there drug pushers or consumers hanging around?") was measured on a ten-point scale, higher scores indicating worse conditions.

Service use was also included in the PSH resident typology. Variables included: number of unmet care needs, frequency of public outpatient or community-based service use, satisfaction with outpatient services other than those provided in the housing, and ED use (0, 1, 2+). The Perceived Need for Care Questionnaire [27] was employed to evaluate the number of unmet care needs on a scale of 0 to 8. PSH residents were queried about receiving care for emotional and/or mental health, or substance use issues across various categories of needs – information, counseling, financial support, personal or home care, social network, medication, work, education, leisure, and harm reduction. Participants could indicate "no need" if care was unnecessary, "met needs" if they received adequate care, "partially unmet needs" if they believed care was inadequate, and "fully unmet needs" if they felt care was necessary but not provided [28]. Participants who reported at least one unmet need or one partially unmet need for any type of care were categorized as having "unmet needs" [29]. In the study, unmet needs for each type of care (e.g., information, counseling) were classified as none, 1–2 or 3+. Public outpatient services included consultations with general practitioners, psychosocial resources provided in community healthcare centers, psychiatric care, and services from addiction treatment centers. These were classified as none, 1 to 5, or 6+ consultations, which corresponded to at least one consultation every two months. Community-based services (e.g., crisis, suicide prevention or day centers; food banks) were categorized as < 13, 13–51, or 52+ visits/year – at least one visit per month. Satisfaction, accounting for each service used, was reported on a 5-point scale, and the mean score considered for each PSH resident, with higher scores denoting increased satisfaction.

Sociodemographic variables associated with PSH resident profiles included: sex, age group, age at the first episode of homelessness, social support, educational status (e.g., high school or less), self-esteem, living in foster care before the age of 18, community integration, and quality of life. Social support and self-esteem were evaluated using the Social Provision Scale [30] and the Rosenberg Self-Esteem Scale [31], respectively, with higher scores indicating more favorable conditions. The Satisfaction with Life Domains Scale [32] and the Community Integration Measure [33] were administered on five-point scales, with higher scores denoting more positive outcomes.

Also associated with PSH resident profiles, clinical variables integrated: MD or SUD diagnoses, chronic physical illnesses (e.g., liver disease, HIV), co-occurring MD-SUD or MD-chronic physical illnesses, psychological distress, perceived physical/mental health status (e.g., poor or fair), suicidal behaviors (suicidal ideations and attempts), and functional disability. MD diagnoses included: serious MD (e.g., schizophrenia), personality disorders, and common MD (e.g., anxiety, depressive disorders). Except for personality

disorders, which were assessed with the Standardized Assessment of Personality Abbreviated Scale [34], MD were evaluated based on the MINI International Neuropsychiatric Interview 6.0 [35]. SUD were assessed using the Alcohol Use Disorders Identification Test (AUDIT) [36] and the Drug Abuse Screening Test-20 (DAST) [37]. Psychological distress and functional disability were gauged with the K-10 [38] and the WHO Disability Assessment Schedule 2.0 [39], respectively, with higher scores indicating more unfavorable conditions – though psychological distress was further categorized as either "none or mild", or "moderate or severe".

Statistical Analysis

The study generated few missing data and outliers (< 1%). Missing data were replaced by mode for categorical variables and mean for continuous variables, and outliers by the value at 99th percentile [40]. Descriptive analyses involved computing percentages for categorical variables, and mean or median values for continuous variables. Since the study data were collected before and after the first waves of the COVID-19 pandemic, t-tests and chi-square tests were used to compare some key variables and identify any differences. PSH resident profiles were generated through cluster analysis, using the k-means group algorithm with a Gower dissimilarity coefficient, based on housing conditions and service use variables. The K-means method is widely used as an iterative or exploratory clustering method [41, 42], in which each cluster is represented by the center or means of the cluster data points. Power to detect clustering with this method is mainly dependent on cluster separation rather than sample size [43] – by comparison, latent class analysis (LCA) requires large samples, with most simulation studies recommending a sample of 500+ participants [44–46]. Considering our study sample size ($n = 308$), model fit statistics didn't exhibit sufficient power to produce LCA. Multiple k-means solutions were thus computed, ranging from 3 to 7 profiles [47]. Calinski-Harabasz pseudo-F value was used for selecting the final analytical classification model, with higher value indicating that the clusters are dense and well separated [48]. Comparison analyses were subsequently conducted to assess statistical differences between profiles based on the participants' sociodemographic and clinical characteristics. Chi-square or Fisher's exact tests were employed for categorical variables, and T-tests for continuous variables. Analyses were produced with Stata 17.

Results

Out of the 345 individuals recruited for the study, 11 were deemed ineligible, and 26 chose not to participate. The final dataset comprised 308 PSH residents – an 89% response rate. There were no significant differences in key variables comparing users before and after the COVID-19 period on sex ($p = 0.487$); satisfaction with case manager or community housing support ($p = 0.653$); psychological distress ($p = 0.681$); physical state ($p = 0.990$), or level of trouble in the neighborhood ($p = 0.462$); unmet needs ($p = 0.496$); and public outpatient services ($p = 0.452$). Most participants (67%) were men, 60% were 50–64 years old, and 66% had a high school education or less. Participants had at 39% serious MD, 28% co-occurring MD-SUD, 33% co-occurring MD-chronic physical illnesses, 31% moderate or severe psychological distress, and 20% suicidal behaviors (Table 1). About 60% lived in single-site PSH, with 53% in PSH for 2+years. Roughly half (56%) had unmet care needs, 41% used 6+public outpatient services, 32% used 52+community-based services, and 37% used ED.

Table 1 Characteristics of patients ($N = 308$)

Study variables[a]	Min	Max	Mean	SD	N	%
Sociodemographic characteristics						
Sex (men)					205	66.56
Women					103	33.44
Age (years)	24	74	54.82	9.64		
18–49					80	25.97
50–64					186	60.39
65+					42	13.64
Age at the first episode of homelessness	7	66	37.14	14.56		
Social support[b]	46	95	67.80	8.60		
Educational status (high school or less)					203	65.91
College or more					105	34.09
Self-esteem[b]	14	40	30.52	5.28		
In foster care before the age of 18					78	25.32
Community integration[b]	11	50	35.65	7.26		
Quality of life[b]	34	100	73.83	12.63		
Clinical characteristics						
Serious mental disorders (MD)[c]					119	38.64
Personality disorders[c]					91	29.55
Common MD[c]					153	49.68
Substance use disorders (SUD)[c]					114	37.01
Co-occurring MD-SUD					85	27.60
Co-occurring MD-chronic physical illnesses					101	32.79
Psychological distress	10	48	21.05	8.26		
None or mild psychological distress					212	68.83
Moderate or severe psychosocial distress					96	31.17
Perceived mental/physical health conditions (good, very good or excellent)					255	82.79
Poor or fair					53	17.21
Suicidal behaviors					63	20.45
Functional disability[d]	11	50	20.37	7.13		
Housing conditions						
Model of permanent supportive housing (PSH) in current residence (scattered-site [private] PSH)					123	39.94
Single-site PSH					185	60.06
Length of residency in PSH (< 2 years)					144	46.75
2+ years					164	53.25
Housing quality[b]	5	25	20.47	3.78		
Satisfaction with case manager or community housing support[b]	20	80	60.48	11.09		
Physical state of the neighborhood[b]	7	70	50.70	12.60	308	100
Level of trouble in the neighborhood[d]	11	108	41.76	23.71		
Level of collective effectiveness in the neighborhood[b]	5	25	14.40	5.28		
Service use patterns						
Number of unmet care needs (none)[e]					136	44.16
1–2					114	37.01
3+					58	18.83
Public outpatient service use (none)					57	18.51

Table 1 (continued)

Study variables[a]	Min	Max	Mean	SD	N	%
1–5 consultations					123	39.94
6+ consultations					128	41.56
Community-based service use (none)					64	20.78
<13 service use					86	27.92
13–51 service use					60	19.48
52+ service use					98	31.82
Satisfaction with outpatient services (mean/SD)[b]	1	5	3.91	1.00		
Using emergency department (ED) (none)					194	62.99
1 time					58	18.83
2+ times					56	18.18

[a]All study variables were assessed for the 12-month period prior to each interview, except for age at the first episode of homelessness, living in foster care before the age of 18, and length of residence in PSH, which were measured over the lifetime. Instruments that were used, including standardized scales, and scoring for each variable, are presented in Supplementary File 1

[b]The minimum, maximum, and mean scores related to the participants' results (variable scoring: Supplementary File 1). Higher scores indicate greater or increased conditions or situations

[c]A participant can have more than one MD or SUD

[d]Higher scores indicate worse or decreased conditions or situations

[e]Unmet needs included eight types of care (see Supplementary File 1), which are represented by a number from 0 to 8. However, in the present study no one reported unmet needs for harm reduction (the eighth type of care), so the range goes from 0 (minimum) to 7 (maximum)

PSH Resident Profiles

A three-profile model was selected as the final analytical classification model, based on the largest Calinski-Harabasz pseudo-F value (14.38) (Table 2). Accounting for 52% of the sample, all Profile 1 residents had lived in PSH for 2+ years. They perceived their housing and the physical state of their neighborhood as being of better quality than Profile 2, but less than Profile 3. Profile 1 included less PSH residents that had 3+ unmet care needs (15%) and 6+ consultations with public outpatient services (40%) than Profile 2 (51% and 80%, respectively), but more than Profile 3 (7% and 21%). Profile 1 was labeled: *PSH residents living there for 2+ years, who perceived their housing and neighborhood to be of moderate quality, and had moderate unmet care needs and public outpatient service use.*

Representing 18% of sample, almost all Profile 2 residents had lived in PSH for less than 2 years, similar in that to Profile 3. Their perception of housing quality and physical state of their neighborhood was the worst of all profiles, and they showed less satisfaction with their case manager or community housing support than Profile 3. With 51% of them showing 3+ unmet care needs, Profile 2 residents had the most unmet needs, and more of them used 6+ public outpatient services (80%) and ED 2+ times (38%). Profile 2 was labeled: *PSH residents perceiving their housing and neighborhood to be of low quality, with high unmet care needs, public outpatient services and ED use.*

Profile 3 accounted for 30% of the sample, with 71% living in single-site PSH. Profile 3 residents had the best perception of their housing and neighborhood quality, reporting the best physical state and lowest trouble in their neighborhood. Profile 3 showed the lowest percentage (6%) of PSH residents with 3+ unmet care needs, and the fewest (21%) with

Table 2 Profiles of residents in permanent supportive housing based on their housing conditions and service use (N = 308)

	Profile 1[a]	Profile 2[b]	Profile 3[c]
Group size: N (%)	161 (52.27)	55 (17.86)	92 (29.87)
Housing conditions			
Model of permanent supportive housing (PSH) in current residence (scattered-site [private] PSH)	70 (43.48)[3]	27 (49.09)[3]	26 (28.26)[1,2]
Single-site PSH	91 (56.52)[3]	28 (50.91)[3]	66 (71.44)[1,2]
Length of residency in PSH (< 2 years)	0 (0)[2,3]	52 (94.55)[1]	92 (100)[1]
2+ years	161 (100)[2,3]	3 (5.45)[1]	0 (0)[1]
Housing quality (mean/SD)	20.24 (3.93)[2,3]	17.96 (3.75)[1,3]	22.35 (2.30)[1,2]
Satisfaction with case manager or community housing support (mean/SD)	60.20 (10.90)	56.83 (12.40)[3]	63.14 (9.99)[2]
Physical state of the neighborhood	50.57 (11.96)[2,3]	44.18 (13.08)[1,3]	55.03 (11.98)[1,2]
Level of trouble in the neighborhood	44.32 (24.84)[3]	52.03 (18.88)[3]	31.15 (20.26)[1,2]
Level of collective effectiveness in the neighborhood	14.04 (5.12)	13.96 (5.35)	15.30 (5.47)
Service use patterns			
Number of unmet care needs (none)	76 (42.70)[2,3]	3 (5.45)[1,3]	57 (61.96)[1,2]
1–2	61 (37.89)[2,3]	24 (43.64)[1,3]	29 (31.52)[1,2]
3+	24 (14.91)[2,3]	28 (50.91)[1,3]	6 (6.52)[1,2]
Public outpatient service use (none)	33 (20.50)[2,3]	0 (0)[1,3]	24 (26.09)[1,2]
1–5 consultations	63 (39.13)[2,3]	11 (20.00)[1,3]	49 (53.26)[1,2]
6+ consultations	65 (40.37)[2,3]	44 (80.00)[1,3]	19 (20.65)[1,2]
Community-based service use (none)	42 (26.09)[3]	11 (20.00)	11 (11.96)[1]
<13 service use	41 (25.47)[3]	15 (27.27)	30 (32.61)[1]
13–51 service use	30 (18.63)[3]	13 (23.64)	17 (18.48)[1]
52+ service use	48 (29.81)[3]	16 (29.09)	34 (36.96)[1]
Satisfaction with outpatient services (mean/SD)	3.88 (1.09)	3.77 (0.83)	4.05 (0.92)
Using emergency department (ED) (none)	104 (64.60)[2]	20 (36.36)[1,3]	70 (76.09)[2]

Table 2 (continued)

	Profile 1[a]	Profile 2[b]	Profile 3[c]
1 time	29 (18.01)[2]	14 (25.45)[1,3]	15 (16.30)[2]
2+ times	28 (17.39)[2]	21 (38.19)[1,3]	7 (7.61)[2]

$\chi 2$ Comparisons are produced for each row reporting percentages for categorical variables and ANOVA t-test for continuous variables. Superscript indicates significant differences at $p < 0.05$. See Table 1 for details on all variables

[a]Profile 1: PSH residents living there for 2+ years, who perceived their housing and neighborhood to be of moderate quality, and had moderate unmet care needs and public outpatient service use

[b]Profile 2: PSH residents perceiving their housing and neighborhood to be of low quality, with high unmet care needs, public outpatient services and ED use

[c]Profile 3: PSH residents living more in single-site PSH with high quality of housing and neighborhood, low unmet care needs, and high community-based service use

6+ public outpatient service uses. Compared to Profiles 1 and 2, Profile 3 had the most residents (37%) using community-based services 52+ times. Profile 3 was labeled: *PSH residents living more in single-site PSH with high quality of housing and neighborhood, low unmet care needs, and high community-based service use.*

Associations Between PSH Resident Profiles and Their Sociodemographic and Clinical Characteristics

Like in Profile 2, those in Profile 1 were younger at their first homelessness episode (35 years) than those in Profile 3 (40 years) (Table 3). Like Profile 3, more Profile 1 (71%) residents had an education of high school or less compared to Profile 2 (55%). Profile 1 PSH residents were less numerous to have common MD (52%), co-occurring MD-chronic physical illnesses (33%), moderate or severe psychosocial distress (32%) and functional disability (21%) than Profile 2 (67%, 53%, 53%, 24%), but still more than Profile 3 (36%, 21%, 17%, 17%). Profile 2 included

Table 3 Associations between profiles of permanent supportive housing residents and sociodemographic and clinical characteristics ($N = 308$)

	Profile 1[a]	Profile 2[a]	Profile 3[a]
Group size: N (%)	161 (52.27)	55 (17.86)	92 (29.87)
Sociodemographic characteristics	%	%	%
Sex (men)	104 (64.60)	34 (61.82)	67 (72.83)
Age (years) (18–49)	33 (20.50)[2]	25 (45.45)[1,3]	22 (23.91)[2]
50–64	104 (64.60)[2]	26 (47.27)[1,3]	56 (60.87)[2]
65+	24 (14.91)[2]	4 (7.27)[1,3]	14 (15.22)[2]
Age at the first episode of homelessness (mean/SD)	35.16 (14.24)[3]	38.10 (13.50)	39.96 (15.32)[1]
Social support (mean/SD)	67.43 (8.66)	65.56 (8.13)[3]	69.82 (8.64)[2]
Education (high school or less)	114 (70.81)[2]	30 (54.55)[1]	59 (64.13)
College or more	47 (29.19)[2]	25 (45.45)[1]	33 (35.87)
Self-esteem (mean/SD)	30.52 (5.30)	29.00 (5.10)[3]	31.42 (5.19)[2]
In foster care before the age of 18	48 (29.81)[3]	17 (30.91)[3]	13 (14.13)[1,2]
Community integration (mean/SD)	35.65 (7.19)	33.65 (6.29)[3]	36.84 (7.74)[2]
Quality of life (mean/SD)	74.75 (12.22)[2]	64.69 (11.01)[1,3]	77.69 (11.67)[2]
Clinical characteristics			
Serious mental disorders (MD)	61 (37.09)[2]	33 (60.00)[1,3]	25 (27.17)[2]
Personality disorders	48 (29.81)[2]	25 (45.45)[1,3]	18 (19.57)[2]
Common MD	83 (51.55)[2,3]	37 (67.27)[1,3]	33 (35.87)[1,2]
Substance use disorders (SUD)	62 (38.51)	23 (41.82)	29 (31.52)
Co-occurring MD-SUD	45 (27.95)	23 (41.82)[3]	17 (18.48)[2]
Co-occurring MD-chronic physical illnesses	53 (32.92)[2,3]	29 (52.73)[1,3]	19 (20.65)[1,2]
Moderate or severe psychosocial distress	51 (31.68)[2,3]	29 (52.73)[1,3]	16 (17.39)[1,2]
Perceived poor or fair mental and physical health conditions	27 (16.77)[2]	16 (29.09)[1,3]	10 (10.87)[2]
Suicidal behaviors	24 (14.91)[2]	24 (43.64)[1,3]	15 (16.30)[2]
Functional disability (mean/SD)	20.85 (7.03)[2,3]	24.07 (7.98)[1,3]	17.33 (5.37)[1,2]

Superscripts indicate *p* value < 0.05. See Table 1 for details on all variables

[a] See the name of each profile below Table 2

the youngest PSH residents (45% were between 18 and 49 years old), but they had lower social support, self-esteem, and community integration than those in Profile 3. Profile 2 also reported the lowest quality of life, and the worst overall clinical conditions compared to Profiles 1 and 3. Less Profile 3 residents were in foster care before the age of 18 (14%) compared to Profiles 1 and 2 (about 30%). Profile 3 also showed the best overall clinical conditions.

Discussion

This study identified three profiles of PSH residents based on their housing conditions and service use, and associated these profiles with the residents' sociodemographic and clinical characteristics. Resident profiles varied considerably, with a minority of them (18% in Profile 2) showing the worst conditions, and a majority of them (52% in Profile 1) characterized by a moderate situation. The fact that only one third of PSH residents (30% in Profile 3) reported favorable conditions demonstrates the need to substantially improve housing, even though PSH represents a notable improvement in living conditions compared to homelessness.

Of all profiles, Profile 2 (18% of sample) reported the lowest quality of housing and neighborhood conditions, and the highest number of service use and unmet care needs – almost all Profile 2 PSH residents had unmet care needs, with half of them showing 3+ needs. However, 80% of them reported 6+ consultations/year, with a third of them showing 2+ ED use/year. Compared to other profiles, more of them had severe MD, co-occurring SUD-chronic physical illnesses, psychosocial distress, functional disability, and suicidal behaviors, which explains their high service use. Previous studies have found similar patient profiles, with a few profiles featuring high service use, multimorbidity, and patients deemed difficult to treat adequately [20, 49], all of which corresponds to the characteristics of high ED users who experience suicidal behaviors [50]. The poor health conditions of Profile 2 residents may also have inhibited their capacity to secure PSH in better neighborhoods. And the fact that Profile 2 residents were younger than those in other profiles and had lived in PSH for less than 2 years may explain why they have the highest number of unmet care needs. It's a known fact that younger service users, especially those with MD-SUD, seldom seek help as they usually prefer to manage by themselves [51]. Profile 2 residents may also lack confidence in services, strong alliances with staff, and coordination between care providers outside of the housing network. Surprisingly, like Profile 3, Profile 2 had the greatest percentage of residents with higher education, yet it showed the worst quality of life. It may be that these younger PSH residents, because they were more educated, were still dealing with the fact that they didn't live up to their own expectations, thus lowering their quality of life. Considering their numerous unmet needs, it's probable they got insufficient or inadequate outpatient help. They may benefit from programs like assertive community treatment [52] and MD-SUD integrated care [53], which were not provided in the PSH included in this study. Given their high psychological distress, co-occurring MD-SUD, suicidal behaviors and overall worse conditions, these residents may also need more psychosocial, crisis, and harm reduction interventions, as well as peer helper support.

In contrast, Profile 3 (30% of sample) showed the best PSH resident characteristics and housing conditions, with the lowest percentages of public outpatient service use, unmet needs, and acute care use. Profile 3 had more protective determinants than the other profiles, and it also included fewer residents who had been in foster care before the age of 18 (about 14%, compared to 30% in Profiles 1 and 2). Profile 3 residents were older when they first experienced homelessness, and they reported higher self-esteem than those of Profiles 1 and 3. Previous research found that being placed in foster care at a younger age increases the risk

of homelessness in adulthood [54]. To become homeless at an older age also favors better outcomes, as individuals may integrate more resources and empowerment [55, 56]. Profile 3 residents also benefited from more social support than those in other profiles, a factor that research often reported as sustaining positive outcomes [57]. Most Profile 3 residents (71%) lived in single-site PSH, while those in Profiles 2 and 3 were pretty evenly distributed between scattered- and single-site PSH. Compared to those in other profiles, Profile 3 residents showed greater appreciation towards the quality of their housing and neighborhood, and were more satisfied with housing support. Single-site PSH offers continuous on-site support, communal spaces, and opportunities for activities, promoting positive feelings (e.g., being loved, being heard) associated with reduced unmet needs [58]. Better neighborhoods usually offer healthier environments, with amenities like parks, shops, improved security and leisure activities, and less noise, all of which have been linked to better overall health and a lesser reliance on public services [59, 60]. Previous studies have found that residents who live in better housing [9] and in single-site PSH [8] have better outcomes. However, since all Profile 3 residents had lived in PSH for less than 2 years, it's possible they already had better conditions before moving into PSH. Profile 3 residents also received more community-based services, which is not surprising considering such services are usually located close to single-site PSH and share their organizational culture. Services like food banks, support groups, and crisis prevention centers could be quite helpful for PSH residents who experience stress and isolation on a daily basis, as they have been found to promote user recovery [61]. The fact that Profile 3 residents had much better health conditions and less unmet care needs may explain why they showed better community integration and quality of life, and less public outpatient and ED use.

Profile 1 PSH residents (52% of sample) showed moderate quality of housing and neighborhood conditions, service use, and unmet needs, all of which could be justified by their health conditions that were also moderate – all ranked better than Profile 2, but worse than Profile 3. Profile 1 residents mainly distinguished themselves from other profiles in that all of them had been living in PSH for more than 2 years – though they were less educated than those of Profile 2. Studies previously found lower levels of education to be associated with lower social opportunity, life expectation, empowerment, and access to services [62]. It is not surprising that Profile 1 residents, who accounted for over half of the sample, had moderate housing and health conditions (including service provision) even after living in PSH for 2 years or more, considering the vulnerability of formerly homeless individuals and the insufficient funding of programs for the homeless [63]. Profile 1 PSH residents may benefit from more overall housing support and care, and from living in better housing environments. Psychosocial, crisis, harm reduction, and empowerment interventions, and peer helper support may also be improved in their case.

Limitations

First, the cross-sectional nature of the study is a limitation, as it prevents the establishment of causality. Second, the reliance on self-reported data may have introduced memory biases [64]. Third, the convenience sampling of PSH residents made of referrals from housing organizations requires further validation for broader applicability of the study results. Fourth, most participants were 50+ years old, recruited solely from a Quebec metropolitan area with a public healthcare system, which also limits generalizability. Fifth, certain PSH resident characteristics (e.g., income, ethnicity, civil status) weren't included in the typology due to their high homogeneity among participants. For instance, 87% of them identified as White, and 96%

lived alone. Sixth, comparisons to other typologies were limited as no previous research was found on PSH resident profiles. Finally, about 20% of the PSH residents in the study didn't have MD or SUD, though these conditions are prerequisites in programs like Housing First or At Home/Chez Soi [2, 65] – limiting further comparisons between PSH models.

Conclusion

Three PSH resident profiles were identified. Accounting for 70% of the sample, Profiles 1 and 2 had moderate or poor housing, neighborhood, and health conditions, but moderate or high unmet care needs and service use. Profile 1 residents (52% of sample) with "moderate" conditions reported living in PSH for over two years and were less educated. Profile 2 PSH residents (18%) had the "worst" overall conditions, high service use, and included younger individuals. Conversely, Profile 3 (30%) featured the "best" overall conditions and integrated residents with more protective determinants (e.g., few in foster care, homelessness at older age, more self-esteem), with the majority of them living in single-site PSH and receiving more satisfying support and community-based services. Considering study results, Profiles 1 and 2 may be provided with more psychosocial, crisis, harm reduction, and empowerment interventions, as well as peer helper support, as they were quite vulnerable and had multiple needs. Profiles 2 residents may benefit from more intensive and integrated care, and better housing conditions. Continuous PSH may be sustained for Profile 3 residents, with regular monitoring of their service satisfaction and met needs – two key components of good quality of support for any PSH residents. Finally, the study demonstrated the heterogeneity of PSH residents, showing they have varied needs and require diversified support.

Abbreviations ED: Emergency department; MD: Mental disorders; PSH: Permanent supportive housing; SUD: Substance use disorders

Availability of Data and Material Signed confidentiality agreements prevent us from sharing the data.

Declarations

Ethics Approval and Consent to Participate This study was approved by the Douglas Mental Health Institute Research Ethics Committee. All participants provided written informed consent in accordance with the Helsinki declaration.

Consent for Publication Not applicable.

Competing Interests The authors declare that there are no conflicts of interest.

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