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Identifying the Patterns of Emergency Shelter Stays of Single Individuals in Canadian Cities of Different Sizes

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ABSTRACT *The study analyzed the patterns of emergency shelter stays of single persons in three Canadian cities of different sizes (i.e., Toronto, Ottawa, and Guelph). Similar to findings of previous research conducted in large American cities in the early 1990s, cluster analyses defined three clusters with distinct patterns of shelter stays (temporary, episodic, and long stay). A temporary cluster (88–94 per cent) experienced a small number of homeless episodes for relatively short periods of time. An episodic cluster (3–11 per cent) experienced multiple homeless episodes also for short periods of time. A long-stay cluster (2–4 per cent) had a relatively small number of homeless episodes but for long periods of time. Despite their relatively small size, the episodic and long-stay clusters used a disproportionately large number of total shelter beds. The study extends findings from previous American research to a Canadian context and to small- and medium-size cities. Implications of the findings for program and policy development are discussed.*

KEY WORDS: Homelessness, cluster analyses, patterns of shelter stays

Homelessness has emerged over the past two decades as a significant social problem in cities across Canada (Gaetz, 2010). Although the exact number of people who experience homelessness annually in Canada is unknown, recent estimates have ranged from 150 000 to 300 000 per year (Echenberg & Jensen, 2008). In addition to an increase in the size of the homeless population, the problem of homelessness is no longer limited exclusively to single men, rather it affects single women, youth, and families as well (Aubry *et al.*, 2003; Hwang, 2001). Given the large number of people who are homeless, and their increasing diversity, program and policy interventions can benefit from research that uses cluster analysis to identify unique subgroups in the homeless population based on meaningful individual characteristics.

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Many of the cluster-analytic studies conducted to date have differentiated subgroups of homeless individuals along a continuum according to the severity and complexity of the problems they experience (Aubry *et al.*, 2012; Morse *et al.*, 1992; Munoz *et al.*, 2005; Solarz & Bogat, 1990). Results in these studies found a group of higher functioning individuals at one end of the continuum and a severely impaired group who had physical and mental health problems and substance abuse difficulties at the other end of the continuum. In between these two extremes, there was a group of individuals who experienced a more moderate level of difficulties as a result of health problems and/or addictions.

Much of the research in this area has been limited to examining relatively small samples of homogeneous subgroups of people who are homeless, categorized on the basis of either age, sex, or some other demographic or clinical characteristic (Adlaf & Zdanowicz, 1999; Bonin *et al.*, 2009; Cherry, 1993; Danseco & Holden, 1998; Goldstein *et al.*, 2008a, 2008b; Humphreys & Rosenheck, 1995; Morse *et al.*, 1991; Zide & Cherry, 1992). Another limitation is that most of the research has been cross-sectional in nature. Therefore, the trajectory of homelessness is unknown or based on self-reported retrospective information on housing history that may lack reliability.

There are two studies in this line of research that address these limitations by defining a typology of clusters from emergency shelter data and classifying single individuals and families based on their pattern of shelter stays over a multiple-year period (Culhane *et al.*, 2007; Kuhn & Culhane, 1998). In a seminal article, Kuhn and Culhane (1998) developed a typology of shelter stay patterns based on length of stay and rate of readmission by analyzing administrative data on public shelter utilization among single homeless adults in New York City from 1988 to 1995 and in Philadelphia from 1991 to 1995. They found three distinct patters of stays among the homeless population of single adults in both cities, which they identified as 'transitional,' 'episodic,' or 'chronic.'

Transitional shelter users typically had a small number of episodes of homelessness over the multi-year period, whereas episodic users had the most episodes and alternated between the shelter system and jails, hospitals, or treatment centers. Chronic shelter users were characterized by fewer, yet longer episodes of homelessness than the episodic group. In both cities, transitional users were more likely to be younger and less likely to report physical and mental health problems and substance abuse issues compared with chronic users. Episodic users were also more likely to be younger than chronic users; however, similar to chronic users, they also showed a tendency to have physical and mental health problems, including substance abuse histories. The chronic users had lower rates of substance abuse in New York and lower rates of mental illness in Philadelphia in comparison with episodic users.

Kuhn and Culhane (1998) argue that this clustering approach is theoretically meaningful and policy-relevant, as it is a means to identify individuals who need different and more intensive interventions to escape homelessness and achieve housing stability. Culhane *et al.*, (2007) conducted a similar cluster analysis of families staying in shelters in six U.S. cities over several years. Results identified three distinct clusters of families based on patterns of shelter stays that were similar to those found for single persons.

Although previous research has found evidence to support a typology of shelter stay patterns for both single persons and families in the United States, no similar research has been conducted in Canada. It is unclear if the different health care and social service systems in the two countries contribute to having different subgroups of people who are

homeless based on patterns of shelter stays. In addition, there has been no replication of the original findings of Kuhn and Culhane (1998), which are based on data collected 20 years ago. Therefore, the objective of this study was to analyze patterns of utilization of emergency shelters in Canadian cities in order to determine if a similar typology can be identified for single adults as has been reported by Kuhn and Culhane (1998).

Method

For the study, we investigated the availability of multi-year administrative data on shelter users in cities across Canada. After contacting knowledgeable individuals working in government and community organizations serving people who are homeless, we identified only three Canadian cities with four or more years of analyzable data. All of these cities were located in the province of Ontario, representing cities of three different sizes (Toronto, 2 503 281; Ottawa, 812 129; Guelph, 114 943; Statistics Canada, 2006). Data on shelter users in these cities were obtained from their respective municipal governments for the four-year period from 2004 to 2007. Ethics approvals for the research, which involved secondary analyses of anonymous databases, were obtained from the Research Ethics Boards of the University of Ottawa and the University of Toronto.

Description of Databases

Toronto

In Toronto, the data on shelter users are collected, stored, and managed by the City of Toronto. Information on each client is collected from shelters using paper-reporting forms, which are then entered into a database by staff at the City of Toronto. The database includes client-level information on sex, date of birth, admission date, discharge date, and total days stayed over the course of a calendar year.

Each client is assigned a unique identification code that is formed using the initials of an individual's first and last name, sex, and date of birth. The complete administrative database on single individuals using emergency shelters in Toronto consisted of client information from 39 shelters, of which 29 served single adults and 10 served youth (i.e., 16–21 years old). The final Toronto data set for the study was made up of 56 533 different individuals.

Ottawa

In Ottawa, shelter providers collect information on shelter users with software known as the Homelessness Individuals and Families Information System (HIFIS). The HIFIS software allows shelter providers to record client-level information, including sex, date of birth, admission date, discharge date, and length of stay. Each client is assigned a unique identification code that is developed by the HIFIS software using an individual's full name and date of birth. The complete administrative database on single individuals staying in emergency shelters in Ottawa consists of client information from six shelters made up of four single adult shelters and two youth shelters (i.e., 16–19 years old). The final Ottawa data set was composed of 18 879 unique individuals.

Guelph

Similar to Ottawa, emergency shelter providers in Guelph collect information on shelter users using the HIFIS software. The recorded client-level information for this database includes sex, date of birth, admission date, and discharge date. Each client is assigned a unique identification number that is developed by the HIFIS software using the individual's full name and date of birth. The complete administrative database for Guelph for single adults and youth consisted of client information from seven emergency shelters, made up of five single adult shelters and two youth shelters (i.e., 16–21 years old). The final Guelph data set contained 1016 different individuals.

Data Preparation

The following data preparation steps were conducted on all three databases:

Identification of cases within study period: Admissions that occurred prior to 1 January 2004 and/or discharges that occurred after 1 January 2008 were excluded from the database. This ensures that each person has the same time period of exposure (four years) to having a shelter stay. The manner for identifying cases in the current study deviated in two notable ways to the original research of Kuhn and Culhane (1998). In particular, unlike Kuhn and Culhane, cases that may have experienced homelessness prior to the start of the four-year period of the database were not removed as this information was not available for two of the three Canadian cities. Then, all cases with episodes of shelter use with discharges before the end of the four-year period were included in order to ensure that large samples were available for analysis in each of the three cities. In contrast, Kuhn and Culhane included only cases who experienced homelessness in the first three years of the eight-year New York City database and in the first two years of the four-year Philadelphia database.

Restructuring of the data file: The database was originally organized to represent all admissions and discharges that had occurred during the four-year study period (2004–2007). Since we were interested in shelter stay patterns for individuals over time, the file was restructured to correspond to the number of individual shelter users. This was completed by using the unique identification code in the databases of the different cities to group multiple stays.

Definition of age groups: Age was computed based on an individual's first admission to the shelter system. Age was categorized in each of the databases for the three cities into four groups: youth (16–19 years), young adult (20–39 years), middle age (40–59 years), and senior (60 years and older).

Calculation of days stayed within shelter: A variable was created to represent the number of cumulative days stayed within the shelter system for each individual by summing all of the 'length of stay' values for that case across episodes of homelessness.

Calculation of number of episodes of homelessness: A variable was created to represent the total number of episodes of homelessness by summing the number of times an individual was admitted to and discharged from a shelter. Following Kuhn and Culhane (1998), the 'total episodes' variable was adjusted such that stays that were separated by

fewer than 30 days were collapsed into a single episode, whereas if two stays were separated by 30 days or more, they were considered to be two distinct episodes of homelessness. This decision was made based on the rationale that an individual who re-enters the shelter system within 30 days has not exited homelessness.

Calculation of average days per episode: A variable was created to represent the average number of days stayed in shelter per episode of homelessness by dividing the 'total days' variable by the 'total episodes' variable for each case.

Standardization of variables: The 'total days' and 'total episodes' variables were standardized to have a mean of zero and a standard deviation of 1. Since the 'total days' variable has a wider range and a higher maximum value than the 'total episodes' variable, this step ensures that the variables are scaled similarly and would have equal weighting in the cluster analysis.

Data Analyses

Data analyses involved the same methods of analyses as described by Kuhn and Culhane (1998). Using SPSS (PASW Statistics 17), the *k*-means cluster analysis procedure (i.e., iterative clustering) was used with the data from each city to construct unique clusters of shelter users using the standardized values of the 'total days' and the 'total episodes' variables for the study period of 2004–2007. Cluster analyses were conducted based on the hypothesis that the optimal solution would yield three distinct clusters of shelter users, each with the specific patterns of shelter use as reported by Kuhn and Culhane.

A series of *t*-tests were conducted on the data for each of the cities to compare the clusters on the two variables used in the cluster analyses, namely the total number of episodes of shelter stays and the total number of days in shelter. In addition, *t*-tests were used to compare the clusters on number of days per episode. The effect size and confidence intervals of the effect size were calculated for each of these comparisons. The final step of the analyses involved comparing the generated clusters on sociodemographic variables that were collected on each individual in the administrative shelter data sets in the different cities.

In addition to initially conducting cluster analyses on the entire data sets in Toronto and Ottawa, cluster analyses were conducted on two randomly generated subsamples in these larger cities to test the reliability of the cluster results (Rapkin & Luke, 1993). A comparison of the cluster membership of cases in each of the two subsamples on average total number of days in shelters and on average number of episodes in shelters found differences of less than 4 per cent for all of the clusters in both cities, with the exception of the long-stay cluster in the Ottawa sample. In this latter case, the difference between the long-stay cluster of the two subsamples on the total number of episodes of homelessness was 9 per cent (i.e., 2.44 vs. 2.68).

Subsequently, discriminant function analyses were conducted using the 'total days' and 'total episodes' variables to predict cluster membership in each subsample of the two cities. The produced classification functions from one subsample were then used to assign cases in the other subsample and compared with the results of the cluster analyses for reliability purposes. Using discriminant analysis, the discriminant function from the first subsample correctly classified 99 per cent or more of cases in the second subsample for each of the cities.

Results

Identification of Clusters in Different Cities

Overall, three distinct clusters were found in each of the three Canadian cities. Based on the pattern of shelter stays of individuals, the clusters were identified as 'temporary' (i.e., small number of shelter episodes and small total number of days in shelter), 'episodic' (i.e., large number of shelter episodes and small total number of days in shelter), or 'long stay' (i.e., small number of shelter episodes and large total number of days in shelter).

Toronto. The sample of single shelter users in Toronto comprised 56 533 shelter users over the four-year study period (2004–2007). Table 1 presents data on shelter utilization variables for each of the three clusters. As shown in Table 1, all of the *t*-tests comparing the three clusters found in Toronto on shelter stay variables were significant at $p < 0.001$. In addition, all of the effect sizes for the differences between clusters on these variables were large (i.e., $d > 0.80$), with the exception of differences between the temporary and episodic clusters on average days per episode in which a small effect size (i.e., $d = 0.16$) was found.

The temporary cluster constituted the majority of the Toronto sample with approximately 87 per cent of the total sample. These shelter users had the lowest number of episodes ($M = 1.24$) and the lowest number of total days spent in shelter ($M = 34.36$) of the three clusters. On average, the temporary cluster stayed 26.91 days per episode of homelessness and accounted for about 41 per cent of the occupied shelter beds ($n = 1.7$ million) over the four-year study period.

In contrast, the episodic shelter users averaged almost six episodes of homelessness ($M = 5.70$), which results in a total of about six months spent in shelter ($M = 181.54$) over the course of the four-year study period. While this group had the most episodes, the average number of days per episode of homelessness amounted to a little over a month per stay ($M = 34.20$). The stay pattern for the episodic group ranged from 3 to 18 episodes and from 4 to 896 days per stay, which is the most varied of the three clusters. The size of the episodic cluster represented roughly 8 per cent of the total sample while occupying 21 per cent of the total shelter beds used ($n = 871\ 593$) over the four-year period.

The long-stay cluster of homeless shelter users represented the smallest group in Toronto making up about 4 per cent of the total sample. This group averaged more than three episodes of homelessness ($M = 3.41$), resulting in an average total of almost two years of residing in emergency shelters ($M = 709.61$) over the four-year period. Of the three clusters, it had the highest average number of days per episode of homelessness ($M = 304.15$). The range of episodes was from 1 to 12 episodes with total stay lengths from 364 to 1461 days, the latter representing the maximum number of days within the four-year study period. The long-stay cluster's use of shelter beds represented a similar proportion of the total occupied (39 per cent) as the temporary cluster in the sample ($n = 1.6$ million).

As shown in Table 4, the demographic characteristics for the Toronto sample of single adult shelter users showed some variation among the temporary, episodic, and long-stay clusters. In particular, there were proportionally more men than women in the long-stay (80 per cent) and episodic clusters (80 per cent) compared to the temporary cluster (71 per cent). The average age of the temporary ($M = 35.10$) and episodic ($M = 35.48$) clusters was about five years younger than the long-stay cluster of shelter users ($M = 40.66$). This age pattern is reflected by the greater number of shelter uses in long-stay cluster who were

Table 1. Patterns of shelter stays of different clusters in Toronto (2004–2007)

	Temporary (1)	Episodic (2)	Long stay (3)	Between-cluster comparisons
Sample size	49 455	4801	2277	
Percentage of clients	87.48	8.49	4.03	
No. of episodes (*M* [SD])	1.24 (0.54)	5.70 (2.14)	3.41 (2.06)	2 > 1: t (4859) = 143.68, $p < 0.001$, $d = 5.44$, CIs [5.40, 5.49] 3 > 1: t (2290) = 50.14, $p < 0.001$, $d = 3.18$, CIs [3.12, 3.24] 2 > 3: t (7076) = –42.42, $p < 0.001$, $d = 1.08$, CIs [1.01, 1.16]
No. of episodes (%):				
1	81.0	–	17.8	
2	13.7	–	22.3	
3	5.3	4.8	20.0	
4	–	32.7	13.7	
5	–	21.1	10.4	
6 or >	–	41.4	15.9	
Total number of days (*M* [SD])	34.36 (58.98)	181.54 (141.09)	709.61 (261.58)	2 > 1: t (4964) = 71.67, $p < 0.001$, $d = 2.10$, CIs [2.05, 2.14] 3 > 1: t (2286) = 123.04, $p < 0.001$, $d = 8.48$, CIs [8.42, 8.55] 3 > 2: t (2921) = 90.3, $p < 0.001$, $d = 2.80$, CIs [2.73, 2.88]
No. of days per episode[a] (*M* [SD])	26.91 (47.26)	34.20 (28.47)	304.15 (247.62)	2 > 1: t (7657) = 15.77, $p < 0.001$, $d = 0.16$, CIs [0.11, 0.2] 3 > 1: t (2283) = 53.38, $p < 0.001$, $d = 3.99$, CIs [3.92, 4.05] 3 > 2: t (2304) = 51.86, $p < 0.001$, $d = 1.90$, CIs [1.82, 1.97]
No. days per episode (%):				
1–30	74.9	55.9	–	
31–60	12.7	25.9	–	
61–90	5.2	11.8	4.1	
91 or >	7.2	6.2	95.9	
No. of occupied shelter beds	1 699 509	871 593	1 615 788	
Percentage of occupied shelter beds	40.59	20.82	38.59	

[a] Average number of days per episode is calculated by calculating an average of the average number of days for each individual.

either middle age (51 per cent) or seniors (6 per cent) when compared to the temporary (middle age: 34 per cent; seniors: 4 per cent) and episodic (middle age: 37 per cent; seniors: 2 per cent) clusters.

Ottawa. The sample of single shelter users in Ottawa comprised a total of 18 879 individuals over the four-year period (2004–2007). As shown in Table 2 and similar to Toronto results, differences between clusters on shelter use variables in Ottawa were all significant at $p < 0.001$.Moreover, the effect sizes for these differences were all large in nature (i.e., $d > 0.80$) with one exception, i.e., the effect size emerging from a comparison of temporary and episodic clusters on average number of days per episode was small ($d = 0.10$).

The temporary cluster of shelter users was the largest of the three clusters representing approximately 88 per cent of the total sample. Of the three clusters, the temporary cluster had on average the lowest number of episodes of homelessness ($M = 1.33$), the lowest number of total days of shelter use ($M = 27.79$), and the shortest length of homeless episodes ($M = 21.32$) over the four-year period. At the same time, the temporary cluster of shelter users accounted for the highest percentage of shelter beds that were used (48 per cent; $n = 460\ 502$) over the four-year period.

In contrast, the episodic cluster had, on average, the most episodes of homelessness ($M = 5.48$) among the three clusters and more total days of homelessness ($M = 123.97$) than the temporary cluster. However, the average number of days per episode for the episodic cluster of individuals proved to be only slightly higher than that for the temporary cluster ($M = 25.23$). The average number of episodes for the episodic group ranged from 3 to 16 episodes. The average total number of days across episodes for the episodic group ranged from 4 to 595 days over the four-year period. This cluster represents approximately 10 per cent of the sample and 25 per cent of the total beds occupied in the shelters ($n = 244\ 591$).

Accounting for only 2 per cent of the total sample, single individuals in the long-stay cluster had the highest average total number of days spent in shelter ($M = 769.27$). The average number of episodes in the long-stay cluster ($M = 2.57$) was lower than that of the episodic cluster (5.48) but higher than that of the temporary cluster ($M = 1.33$). On the other hand, the average number of days per episode of homelessness ($M = 488.54$) is the highest of the three clusters. The variability in the pattern of shelter stays for the long-stay cluster is evident by the total number of episodes in the cluster ranging from 1 to 10 episodes with length of episodes lasting from 402 to 1461 days. Despite the relatively small proportion of individuals in this cluster, the number of shelter beds taken up by these individuals represented 27 per cent of the total beds occupied during the four-year period ($n = 258\ 474$).

Table 4 presents the demographic characteristics for each of the clusters. The demographic characteristics of single adult shelter users for the three clusters in Ottawa showed similar breakdowns as in the Toronto sample. Specifically, there were proportionally more men than women in the long-stay (89 per cent) and episodic (86 per cent) clusters compared to the temporary cluster (72 per cent). In terms of average age, the long-stay shelter users proved to be the oldest ($M = 48.33$) among the three clusters followed by the episodic cluster ($M = 37.64$) and the temporary cluster ($M = 35.56$). Again, the older age of the long-stay cluster is reflected in the higher percentage of middle-age (69 per cent) and senior shelter users (12 per cent) compared to the temporary cluster (middle age: 36 per cent; senior: 4 per cent) and the episodic cluster (middle age: 43 per cent; senior: 3 per cent)

Table 2. Patterns of shelter stays of different clusters in Ottawa (2004–2007)

	Temporary (1)	Episodic (2)	Long stay (3)	Between-cluster comparisons
Sample size	16 570	1973	336	
Percentage of clients	87.77	10.45	1.78	
No. of episodes (*M* [SD])	1.33 (0.61)	5.48 (2.08)	2.57 (1.86)	2 > 1: t (2013) = 88.24, $p < 0.001$, $d = 4.66$, CIs [4.59, 4.73] 3 > 1: t (337) = 12.24, $p < 0.001$, $d = 1.88$, CIs [1.72, 2.05] 2 > 3: t (2307) = 24.01, $p < 0.001$, $d = 1.42$, CIs [1.25, 1.59]
No. of episodes (%):				
1	74.5	–	40.5	
2	17.9	–	20.8	
3	7.6	6.7	12.2	
4	–	35.6	10.7	
5	–	21.8	6.3	
6 or >	–	23.6	9.5	
Total no. of days (*M* [SD])	27.79 (48.90)	123.97 (110.81)	769.27 (294.00)	2 > 1: t (2064) = 38.11, $p < 0.001$, $d = 1.64$, CIs [1.57, 1.71] 3 > 1: t (335) = 46.22, $p < 0.001$, $d = 11.64$, CIs [11.48, 11.81] 3 > 2: t (351) = 39.76, $p < 0.001$, $d = 4.25$, CIs [4.08, 4.43]
No. of days per episode[a] (*M* [SD])	21.32 (39.44)	25.23 (25.95)	488.54 (389.54)	2 > 1: t (3178) = 5.93, $p < 0.001$, $d = 0.10$, CIs [0.03, 0.17] 3 > 1: t (335) = 21.98, $p < 0.001$, $d = 6.94$, CIs [6.78, 7.1] 3 > 2: t (336) = 21.79, $p < 0.001$, $d = 3.08$, CIs [2.91, 3.26]
No. days per episode (%):				
1–30	80.1	71.9	–	
31–60	10.8	16.3	–	
61–90	3.8	8.2	3.0	
91 or >	5.3	3.6	97.0	
No. of occupied shelter beds	460 502	244 591	258 474	
Percentage of occupied shelter beds	47.80	25.38	26.82	

[a] Average number of days per episode is calculated by calculating an average of the average number of days for each individual.

Guelph. The sample of single shelter users in Guelph comprised 1016 shelter users over the four-year study period (2004–2007). Table 3 presents data on shelter utilization variables for each of the three clusters. All of the comparisons between the clusters on shelter use variables yielded significant differences at $p < 0.001$ that represented large effects ($d > 0.80$) with two exceptions, i.e., there were no significant differences between the temporary and long-stay clusters in terms of number of episodes and no significant differences between the temporary and episodic clusters on number of days per episode.

Once again, the temporary cluster represented the largest proportion of shelter users (94 per cent). The cluster also had the lowest average number of episodes ($M = 1.13$) and the lowest average total number of days ($M = 22.16$) over the four-year period. The average number of days per episode ($M = 20.11$) was less than the long-stay cluster but more than the episodic cluster. The temporary cluster used 68 per cent of shelter beds among the total sample.

The episodic cluster, making up about 3 per cent of the sample, had the highest number of homeless episodes ($M = 3.18$) among the three clusters. The average number days per episode was the lowest of the three clusters ($M = 17.82$), and the cluster also used proportionally the lowest number of shelter beds (6 per cent). Although the long-stay cluster of individuals also accounted for only about 3 per cent of the sample, they occupied 26 per cent of the shelter beds in Guelph because of their high number of shelter days per homeless episode ($M = 222.53$).

As presented in Table 4, some differences in the breakdown on sociodemographic characteristics of the three identified clusters did emerge in the Guelph data. In particular, there were proportionally more women (68 per cent) in the long-stay cluster, more men (70 per cent) in the episodic cluster, and relatively equal proportion of men (54 per cent) to women (46 per cent) in the temporary cluster. In addition, the pattern of the average age of the three clusters in Guelph proved to be the opposite of the pattern found in Ottawa and Toronto with the long-stay cluster being on average the youngest of the three clusters ($M = 18.38$) compared to the episodic cluster ($M = 32.29$) and the temporary cluster ($M = 33.53$) that had similar average ages. In fact, the entire long-stay cluster of individuals was made up of either youths (83 per cent) or young adults (17 per cent). In comparison, both the episodic cluster (youth: 18 per cent; young adults: 53 per cent) and the temporary cluster (youth: 24 per cent; young adult: 40 per cent) were proportionally made up of less youth and more young adults. In addition, the temporary cluster (33 per cent) and episodic cluster (29 per cent) had similar proportions of middle-age individuals, and only the temporary cluster included individuals who were seniors.

Discussion

The study contributes new knowledge by extending previous American research conducted in large cities to a Canadian context and to small- and medium-size cities. Our study findings show the presence of three distinct clusters of similar sizes among single adults staying in emergency shelters in the three Canadian cities. The clusters that we defined as ‘temporary,’ ‘episodic,’ and ‘long stay’ are in line with those found in two large American cities two decades ago (Kuhn & Culhane, 1998).

In addition to finding the same types of clusters, our results also showed the temporary cluster to be the largest of the three clusters similar to the ‘transitional’ cluster of Kuhn and Culhane. In contrast to Kuhn and Culhane (1998), our long-stay cluster represented a

Table 3. Patterns of shelter stays for different clusters in Guelph (2004–2007)

	Temporary (1)	Episodic (2)	Long stay (3)	Between-cluster comparisons
Sample size	951	34	31	
Percentage of clients	93.60	3.35	3.05	
No. of episodes (*M* [SD])	1.13 (0.33)	3.18 (0.39)	1.29 (0.53)	2 > 1: t (983) = 35.01, $p < 0.001$, $d = 6.17$, CIs [5.65, 6.69] 2 > 3: t (55) = 16.28, $p < 0.001$, $d = 4.09$, CIs [3.34, 4.84]
No. of episodes (%):				
1	87.3	–	74.2	
2	12.7	–	22.6	
3	–	82.4	3.2	
4	–	17.6	–	
5	–	–	–	
Total no. of days (*M* [SD])	22.16 (21.92)	55.53 (41.02)	254.90 (121.48)	2 > 1: t (34) = 4.72, $p < 0.001$, $d = 1.45$, CIs [0.94, 1.97] 3 > 1: t (30) = 10.66, $p < 0.001$, $d = 7.68$, CIs [7.14, 8.22] 3 > 2: t (36) = 8.70, $p < 0.001$, $d = 2.24$, CIs [1.5, 2.99]
Average days per episode[a] (*M* [SD])	20.11 (20.33)	17.82 (13.75)	222.53 (135.79)	3 > 1: t (30) = 8.30, $p < 0.001$, $d = 6.52$, CIs [5.97, 7.06] 3 > 2: t (30) = 8.36, $p < 0.001$, $d = 2.17$, CIs [1.43, 2.92]
No. of days per episode (%)				
1–30	80.9	88.2	–	
31–60	15.3	11.8	–	
61–90	1.7	–	6.5	
91 or >	2.1	–	93.5	
No. of occupied shelter beds	21 071	1888	7902	
Percentage of occupied shelter beds	68.28	6.11	25.61	

[a] Average number of days per episode is calculated by calculating an average of the average number of days for each individual.

Table 4. Comparisons of clusters on sex and age groups for Toronto, Ottawa, and Guelph

Demographic characteristics	Temporary (1)	Episodic (2)	Long stay (3)	Between-cluster comparisons
Toronto (*N*)	49 455	4801	2277	
Male (%)	71.2	80.4	81.1	$1 < 2$, $\chi(1) = 185.36$, $p < 0.001$, OR $= 0.60$, CIs [0.56, 0.64] $1 < 3$, $\chi(1) = 86.08$, $p < 0.001$, OR $= 0.61$, CIs [0.55, 0.68]
Age (*M* [SD])	35.10 (12.87)	35.48 (11.69)	40.66 (12.54)	$2 > 1$, $t(5986) = 2.11$, $p < 0.05$, $d = 0.03$, CIs [−0.02, 0.07] $3 > 1$, $t(2502) = 20.67$, $p < 0.001$, $d = 0.43$, CIs [0.37, 0.5] $3 > 2$, $t(4202) = 16.61$, $p < 0.001$, $d = 0.43$, CIs [0.36, 0.51]
Youth (%)	12.3	11.3	6.1	
Young adult (%)	50.0	49.8	37.0	
Middle age (%)	34.1	36.7	50.5	
Senior	3.6	2.2	6.4	
Ottawa (*N*)	16 560	1971	336	
Male (%)	71.8	85.6	89.3	$1 < 2$, $\chi(1) = 170.02$, $p < 0.001$, OR $= 0.43$, CIs [0.22, 0.43] $1 < 3$, $\chi(1) = 49.89$, $p < 0.001$, OR $= 0.31$, CIs [0.55, 0.68]
Age (*M* [SD])	35.56 (10.73)	37.64 (11.13)	48.33 (13.02)	$2 > 1$, $t(2663) = 7.70$, $p < 0.001$, $d = 0.19$, CIs [0.12, 0.26] $3 > 1$, $t(356) = 21.51$, $p < 0.001$, $d = 1.18$, Cis [1.02, 1.35] $3 > 2$, $t(2306) = 16.37$, $p < 0.001$, $d = 0.94$, CIs [0.77, 1.11]
Youth (%)	12.5	5.1	0.6	
Young adult (%)	47.9	49.4	19.0	
Middle age (%)	35.6	42.5	68.8	
Senior (%)	3.9	3.0	11.6	

(*Continued*).

Table 4. *Continued.*

Demographic characteristics	Temporary (1)	Episodic (2)	Long stay (3)	Between-cluster comparisons
Guelph (*N*)	947	34	31	
Male (%)	53.6	70.6	32.3	$2 > 1$, $\chi(1) = 3.80$, $p < 0.001$, OR = 2.07, CIs [0.98, 4.39] $3 < 1$, $\chi(1) = 5.51$, $p < 0.02$, OR = 0.41, CIs [0.19–0.88] $3 < 2$, $\chi(1) = 9.55$, $p < 0.005$, OR = 0.20, CIs [0.07–0.57]
Age (*M* [SD])	33.53 (13.92)	32.29 (11.32)	18.38 (4.34)	$1 > 3$, $t(51) = 16.15$, $p < 0.001$, $d = 1.10$, CIs [0.56, 1.64] $2 > 3$, $t(44) = 6.62$, $p < 0.001$, $d = 1.59$, CIs [0.85, 2.34]
Youth (%)	23.7	17.6	82.8	
Young adult (%)	39.7	52.9	17.2	
Middle age (%)	32.7	29.4	–	
Senior (%)	3.9	–	–	

Note: youth = 16–19 years old; young adult = 20–39 years old; middle age = 40–59 years old; senior = 60 and above.

smaller proportion of shelters users in the full sample (i.e., 2–4 per cent) than the chronic cluster found in the samples from two large American cities (i.e., 10 per cent). The differences may be the result of a significant investment in community mental health services in Ontario over the past decade that included assisting people with severe and persistent mental illness to become stably housed (Community Mental Health Evaluation Initiative, 2004; Service Enhancement Evaluation Initiative Coordinating Centre, 2009). Kuhn and Culhane noted that relative to the other two clusters, the chronic cluster of individuals had higher levels of mental health, substance abuse, and medical problems.

On the other hand, our episodic clusters had a similar proportion of the total samples in Toronto and Ottawa (i.e., 8–10 per cent) as the episodic cluster in the two large American cities (i.e., 9–12 per cent; Kuhn & Culhane, 1998). Kuhn and Culhane noted the similarity in health problems experienced by the chronic cluster and episodic cluster of shelter users. The significantly shorter shelter stays of the episodic cluster relative to the long-stay cluster may serve to limit their opportunity to access needed health and social services. Ultimately, they may be prone to falling through the cracks because their length of shelter stay is similar to the temporary cluster of individuals, who represent the vast majority of shelter users.

Relative to their size, the episodic and long-stay clusters are very heavy shelter users because of the combination of the larger number of shelter stays and the longer duration of shelter stays, respectively. These findings from Canadian cities mirror those of Kuhn and Culhane (1998) in the context of American cities. In the case of Toronto and Ottawa, individuals in these two clusters occupied over half of the shelter beds during the four-year period of the study even though they represented only between 12 per cent and 13 per cent of the shelter population. The small number of individuals in the long-stay clusters of the three cities, representing only 2–4 per cent of shelter users, occupied over 25 per cent of the beds in Ottawa and Guelph and almost 40 per cent of the beds in Toronto.

There were a greater proportion of men in the long-stay and episodic clusters than in the temporary cluster in both Toronto and Ottawa. In Guelph, there were proportionally more women in the long-stay cluster, more men in the episodic cluster, and almost an equal proportion of men to women in the temporary cluster. In contrast, Kuhn and Culhane found no differences in terms of the proportion of men (i.e., approximately 82 per cent) relative to women making up all three clusters in New York City. A breakdown of the clusters of individuals identified in Philadelphia by sex showed a similar pattern as in Guelph. However, unlike Guelph, men still formed a majority of individuals in each of the clusters. It is possible that the ease with which men and women are able to access services may differ across various cities, thus contributing to the differences in terms of proportions of men and women in each cluster. For example, we know that in Ottawa, single women are more successful in exiting homelessness over a two-year period than single men, at least in part due to women being able to successfully obtain subsidized housing (Aubry *et al.*, 2007). This finding could explain the proportions of men and women in the various clusters in Ottawa, but may not hold true in other cities, such as Guelph.

Individuals in the long-stay clusters of Ottawa and Toronto were, on average, older than temporary and episodic clusters with a greater proportion of them being middle-aged and senior-aged than the other two clusters. Kuhn and Culhane (1998) reported a similar relationship between age categories and different clusters for shelter users in New York City but not for Philadelphia where their ‘chronic cluster’ of individuals was only slightly

older than the other two clusters. In contrast, the chronic cluster in Guelph was younger than the other two clusters with a greater proportion of these individuals falling in the youth and young adult categories.

It is unclear to what extent the differences in the demographic characteristics between the cities are tied to the manner in which services are delivered to different age groups in each of the cities. However, it is noteworthy that the make-up of the clusters relative to sex and age was similar for Toronto and Ottawa. The relatively small size of the episodic and long-stay clusters in Guelph limits the generalizability of its results.

Study Limitations

The study is limited by the nature of the data, which was collected for administrative purposes in a large number of shelters in three different cities. It can be expected that a large number of personnel are involved in the collection of this data and that procedures are likely to vary from shelter to shelter and from city to city. Also, a specific limitation of this kind of data collection is accurately identifying individuals who used two or more different shelters during the four-year time period as the same user. The problem was noted by City of Ottawa personnel responsible for the databases as being particularly prevalent for single men in Ottawa who circulated among three different shelters. Moreover, there is no way of determining if individuals experienced other episodes of homelessness using shelters in other cities. As a result, some individuals might be misclassified in the cluster analysis since their number of episodes and the total amount of time that they are using emergency shelters may be underestimated. This limitation would increase the size of the temporary cluster at the expense of the episodic and long-stay clusters.

Similarly, the small differences in our methodology relative to Kuhn and Culhane (1998), whereby cases were culled from the database based on having episodes of shelter stays prior to the date start of the database or experiencing a first episode of shelter use at a later stage but within the date parameters of the database, is likely to contribute to a small overestimation in our results of individuals with temporary stays combined with an underestimation of individuals with episodic stays compared to Kuhn and Culhane's findings. In addition, it is important to note that the results are based on patterns of shelter use and not on patterns of homelessness that can include staying temporarily with family, friends, or acquaintances, or living on the street. As such, some individuals may be classified as having an episodic pattern of shelter stays, when in fact they are cycling between short stays at emergency shelters and temporary accommodations with others or on the street, and thus could be described as having a long-stay pattern of homelessness.

Another limitation is the small number of demographic variables and the lack of health status variables that were available in the shelter administration databases that we accessed in the three Canadian cities. Unlike Kuhn and Culhane (1998), we were not able to merge the shelter databases with health care and correctional services databases because of the privacy laws that exist in Canada. As a result, it was not possible to differentiate members in the different clusters according to their medical history, mental health status, or their pattern of substance use, or justice service use.

As previously mentioned, the small sample size of shelter users in the Guelph shelter database in Guelph resulted in the creation of episodic and long-stay clusters that contained a small number of individuals. Therefore, the reliability of the size of these clusters and the

make-up according to sex and age cannot be determined. However, because previous research has only been conducted in large cities, we decided to include a small city in our research and report the findings in this paper. Related to this point, at the time of the study, we were only able to access four years of administrative shelter data from three cities in Canada. It is important to note that the findings are based on data from Ontario cities and it is possible that differences in patterns of shelter use may be present in cities located in other Canadian provinces. On the other hand, the fact that the size and patterns of shelter stays were similar across three cities of different sizes suggests that these findings may be generalizeable to other Canadian cities. In addition, it is noteworthy that the results also show similarities to those found in American cities (Kuhn & Culhane, 1998).

Implications for Program and Policy Development

The different patterns of shelter stays emerging in the study suggest that different program and policy development strategies should be used for each of the different clusters. From an efficiency perspective, targeting individuals in the long-stay cluster seems to make sense given that the population is relatively small and easily identifiable, and that their lengths of shelter stays are the highest in all of the cluster groups. For these individuals, a combination of assistance related to finding, moving into and keeping housing, and intensive social service support for an extended period of time appears to be indicated. Housing first approaches that include subsidized housing and support delivered through intensive case management or assertive community treatment have been shown to be effective in assisting people with severe and persistent mental illness to exit homelessness (Nelson, 2010; Nelson *et al.*, 2007).

Similar to individuals in the long-stay cluster, shelter users that are captured in the episodic cluster are likely to benefit from assistance that includes housing resettlement and ongoing support as delivered in housing first approaches, since their pattern of shelter stays suggest that once housed, they may regularly encounter difficulties that lead to further episodes of homelessness. It is quite possible that because the length of their episodes of shelter stays is similar to that of individuals in the temporary cluster, they may cycle in and out of emergency shelters without being identified as someone who requires help beyond finding housing. The key issue for assisting individuals in this cluster involves using their shelter stay history to accurately identify them within the homeless population. Previous research has suggested that the episodic cluster may be made up of individuals with substance use problems, and these problems contribute to their housing instability over the longer term (Aubry *et al.*, 2012; Culhane & Metraux, 2008; Kuhn & Culhane, 1998).

Finally, interventions directed at the majority of individuals making up the temporary cluster should focus on helping them become re-housed as quickly as possible with supports limited to short-term help related to finding and moving into housing. The difference in the patterns of shelter stays of the temporary and episodic clusters highlights the importance of screening shelter residents on the basis of their homelessness history and allocating support accordingly. Culhane and Metraux (2008) propose the use of residential transitional programming, such as halfway houses and supported housing, for individuals who are discharged from psychiatric hospitals, detoxification programs, and prisons. It is estimated that up to one-third of single adults accessing emergency shelters originate from these public institutions, with many likely to be captured in the temporary cluster. For other individuals making up the temporary cluster who had not been living in an

institution, the use of relocation assistance such as emergency cash assistance, time-limited rent subsidies, and referral to support and employment services are needed (Culhane & Metraux, 2008; Culhane *et al.*, 2011). The use of short-term approaches with this population is based on the premise that these individuals can resolve housing crises in a relatively brief amount of time and require only limited assistance to do so.

It is important to note that the size of the homeless population has increased dramatically in Canadian cities over the past 20 years (Hulchanski, 2002; Hulchanski *et al.*, 2009). There is recognition that major factors contributing to this increase include a growing number of people living in poverty along with a shrinking affordable housing stock (Gaetz, 2010; Hulchanski *et al.*, 2009; Moore & Skaburskis, 2004). These structural factors are likely playing a role in the homelessness of individuals regardless of their pattern of shelter stays. Ultimately, policy responses that target the increase of income-support levels for individuals living in poverty as well as increase the affordable housing stock in Canadian cities can be expected to prevent and reduce homelessness among individuals with temporary, episodic, or long-stay patterns of shelter stays.

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