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ROLE OF STRESSFUL LIFE EVENTS AMONG HOMELESS WOMEN: AN INTRAGROUP ANALYSIS

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Abstract

The aim of this study is to replicate the paper by Muñoz et al. (2005) using cluster and discriminant analysis in a sample of 116 homeless women. The sample was organized into different subgroups on the basis of Stressful Life Events (SLEs) experienced and to characterize the differences between the resulting subgroups in terms of their sociodemographic characteristics, homeless trajectories, physical and mental health, and social support. The results suggest that the three-cluster solution was theoretically and structurally meaningful: 1) the "Shorter homelessness trajectories and best functioning" subgroup was characterized by low levels of SLEs, a shorter homeless trajectory, lower prevalence of physical and mental health problems and lower rates of alcohol and substances consumption; 2) the "Early onset of homelessness and rapid deterioration" subgroup was characterized by a higher prevalence of childhood and adolescence SLEs, an early onset of homelessness and greater chronification, mental health problems and alcohol consumption; and 3) the "Revolving door to homelessness and late deterioration" subgroup was mainly characterized by a higher prevalence of typically adulthood SLEs, as well as some women-specific SLEs, a greater number of homeless situation, physical health problems, disabilities and substance abuse. Increased knowledge about the different subgroups and trajectories of homeless women, as well as their specific characteristics and needs, will help us to design social services and policies sensitive to all these differences.

Keywords: homelessness, homeless women, stressful life events, cluster analysis, subgroups.

Introduction

The first of the United Nations Sustainable Development Goals (SDGs) aims to end poverty in all its forms everywhere. Homelessness is the extreme form of poverty and social exclusion in developed countries (Mayock & Bretherton, 2016). In order to better understand this phenomenon, several studies have analyzed the individual factors that contribute to homelessness, including mental disorder, substance abuse, disabilities, health problems, income shocks, social support and lack of economic resources, among others (Blow et al., 2004; Susser et al., 1991).

One of the main factors contributing to homelessness is the experience of Stressful Life Events (SLEs), episodes that play a key role in one´s life and that frequently mean significant changes to the person involved (Vazquez et al., 2005). Over the decades, different studies have examined this relationship and reported high SLE rates throughout the lives of homeless people (Muñoz et al., 1999; Padgett et al., 2012; Rodriguez-Moreno et al., unpublished[1]). Furthermore, these events play a fundamental role in originating and maintaining situations of homelessness (Muñoz et al., 1999; Vázquez et al., 2019).

Several studies to date have found a high prevalence of stressful life events in childhood (Stein et al., 2002; Tam et al., 2003). These events included parents with alcohol or drugs problems, mothers abused by partners, own experiences of abuse, running away from home and dropping out of school. Furthermore, some childhood events such as family disorganization (Shelton et al., 2009) childhood abuse and lack of parental care (Herman et al., 1997), adverse childhood experiences (Montgomery et al., 2013) and parental substance abuse (Bassuk et al., 1997) are associated with homelessness in adulthood. In addition, the homeless also experience a high number of SLEs in adulthood, including physical or sexual violence, jail sentences, assault or robbery (Stein et al., 2002; Vázquez, & Muñoz, 2001), emigration from their homeland, serious illness, injury or accident, and mental illness, among others (Rodriguez-Moreno et al., unpublished).

There is a close relationship between homelessness and mental illness (Chambers et al., 2014). Epidemiological data show mental health problems are more prevalent among homeless people than the general population (Lebrun-Harris et al., 2013). But homelessness is not only related to mental health problems, but also to other risk factors such as social isolation and substance abuse (D'Amore et al., 2001). In addition, traumatic events and the stress produced by the homeless situation aggravate the symptoms of mental health problems, thereby increasing the vulnerability of the homeless and leading to the emergence of other risk factors (Castellow et al., 2015; Rayburn et al., 2005). Other research has also highlighted the role that substance abuse, social support and physical health play in SLEs among the homeless (Muñoz et al., 2005). As far as homeless trajectories are concerned, Roca et al. (2019) also found that experiencing SLEs has a direct impact on the effect on the chronification of homelessness (the so-called "revolving door to homelessness"), while Brown et al. (2016) found that there is an inverse correlation between the age at which the individual becomes homeless and the number of events experienced.

Current evidence suggests that homeless women are especially vulnerable to mental health problems and SLEs (Duke & Searby, 2019; Vázquez & Panadero, 2019). Firstly, homeless women experience different types of SLEs with respect to their male

[1] Available upon request

counterparts**:** men tend to suffer more SLEs related to legal problems and substance abuse, while women tend to experience more abuse (sexual, physical and psychological), partner violence and psychiatric hospitalization (Hatch & Dohrenwend, 2007; Rodriguez-Moreno et al., unpublished; Zugazaga, 2004). Furthermore, family and financial pressures related to domestic violence make the situation of homeless women even more complex (Kirkman et al., 2015). Secondly, researchers in the field have shown how homeless women are more liable to processes of victimization and idiosyncratic mental health problems that men in the same situation (Tsai et al., 2015). For instance, homeless women have shown a higher likelihood of experiencing traumatic events and higher rates of post-traumatic stress symptoms than their male counterparts (Tsai et al., 2014). In view of all these findings, as authors have highlighted, there is a need to conduct specific research into the plight and needs of homeless women (Duke & Searby, 2019; Zugazaga, 2004), paying special attention to the role of SLEs in the equation.

The strategy of using multivariate procedures and cluster analysis to classify the homeless population into different subgroups have been widely used in the literature to identify the specific needs, characteristics and trajectories (e.g. Cronley et al., 2018; Waldron et al., 2019), which is essential for planning programs addressing the specific needs of each subgroup. In a pioneering study, Muñoz et al. (2005) used multivariate statistics to analyze the individual differences in SLEs in a representative sample of homeless people in Madrid city (Spain), including a comprehensive list of all homeless shelters in the city together with a "S-night" survey to identify those homeless individuals who were excluded from the multicenter sampling (e.g., homeless sleeping on the street and not using the shelters). They found that the homeless sample could be organized into three subgroups or clusters based on their SLEs: the first subgroup was characterized by economic problems (48.82%); the second by health problems, alcohol abuse, and the death of the parents (31.50%); and the third by a greater number of childhood SLEs and alcohol abuse (19.68%).

Taking into account the high vulnerability of homeless women and the huge quantitative and qualitative differences between homeless men and women in terms of SLEs (Rodriguez-Moreno et al., unpublished), we decided to carried out a similar study focused exclusively on homeless women. Furthermore, the Muñoz et al. (2005) study included a proportion of homeless women smaller than men. In fact, the latest Comprehensive National Strategy for Homeless People in Spain emphasizes the need to make homeless women more visible, trying to respond specifically to their needs (Ministry of health, social services and equality, 2016). Moreover, given the ongoing replication crisis in psychological science (Maxwell et al., 2015) replication studies are necessary to develop a cumulative science of the homeless characteristics and needs, which in turn is crucial for the design of interventions and social policies based on the empirical).

The present study has three main objectives: 1) to organize the sample of homeless women into different subgroups on the basis of their SLEs and to determine whether SLEs predict group membership; 2) to analyze whether there are significant differences among the homeless women in the different SLE clusters in terms of sociodemographic, homeless trajectory, physical and mental health, and social support variables; and 3) to replicate these results with the three subgroups identified by Muñoz et al. (2005).

Method

Participants

A sample of 136 homeless women in the city of Madrid (Spain) participated in this study; complete data for the study variables were available for 116 of them. All the participants were adults and had spent the night before the interview in a shelter or supervised accommodations for the homeless, in the street, or in other places not initially designed for sleeping (abandoned buildings, basements, etc.). The inclusion criteria were as follows: 1) being a woman; 2) being older than 18; 3) providing informed consent; and 4) being able to understand the interview in Spanish or English. The exclusion criterion was not being able to complete the evaluation due to cognitive impairments or the effects of drugs or alcohol during the interview.

The sample size was determined by using a classical sample size formula, including information on the population size, the confidence level, population variance and sampling error. According to the homeless people count, there were around 400 homeless women in Madrid (Madrid City Council, 2010), so our sample of 136 homeless women represents 34% of the population.

The participants' mean age was 45.5 (*SD*=11.37). They were mainly Spanish (65.4%), single (60.3%), some (21.3%) had not completed primary education, and almost all (90.4%) were unemployed. Missing values analysis showed that there was only 1.8% of overall missing values at item-level. Due to the traumatic content of the items on the Stressful Live Events scale, the answer option "Don´t know / No reply" was offered for ethical reasons, which gave rise to the missing values. Furthermore, a diagnosis of the random pattern of the missing data carried out using the Little MCAR test ($\chi^2_{(914)}$ = 999.45, p > .01) concluded that the missing data were completely random.

Measures

In order to guarantee the homogeneity of the data collected and to overcome any possible problems derived from the reading and writing skills of the sample (sometimes due to language problems), a structured interview was carried out. The full structured interview lasted between 45 and 60 minutes. Information was gathered for a wide range of variables: sociodemographic factors, living conditions, stressful life events, physical and mental health, well-being and social support.

Sociodemographic factors and trajectories of homelessness: The interview contained some questions about trajectories of homelessness. These included age at which homelessness become, total time homelessness and number of homelessness times. A question touching on aporophobia was also included: "Since you have been homeless, have you felt discriminated against for this reason?".

Stressful Life Events: An adapted version of the *List of stressful life events for groups in social exclusion* (L-SVE) (Panadero et al., 2018) was used consisting of a list of 47 dichotomous events (yes/no) in childhood/adolescence and life-long events. Furthermore, for this study we added 8 items related to women-specific SLEs (e.g. SLEs related to maternity, abortion or being a single mother, among others). Therefore, there were a total of 55 items. A detailed list of the L-SVE used in this study is attached in Supplementary Materials (Supplementary Table 1 and 2).

Health: Our study used the Spanish validation of the short version of GHQ-28 (GHQ-28; Goldberg & Hillier, 1979; Lobo et al., 1986). GHQ-28 is a widely used self-

reporting measure for assessing psychiatric morbidity during the last month and is made up of four factors: somatic symptoms, anxiety symptoms (including insomnia), social dysfunction and depression symptoms. Furthermore, other questions about previous health problems, disabilities (physical, sensory and mental), hospitalizations, mental health problems and subjective health perceptions were included.

Alcohol and substance consumption: The Alcohol Use Disorders Identification Test (AUDIT) was used to assess excessive alcohol consumption (Saunders et al., 1993; Spanish adaptation, Rubio et al., 1998). AUDIT consists of 10 questions about the level of consumption, symptoms of dependence and alcohol-related consequences. We also applied the Drug Abuse Screening Test (DAST-10) to analyze substance consumption (Skinner, 1982; Spanish adaptation, Pérez et al., 2010). DAST-10 is a 10 item self-reporting measure with dichotomous response items (yes/no). Furthermore, a question about polydrug use was included to analyze the number of substances consumed in the last month.

Social Support: Inspired by the Course of Homelessness Study Questionnaire (Koegel et al., 1995) and the Social Support Questionnaire (SSQ) (Sarason et al., 1987), nine questions about social support were included in the interview relating to: the existence of significant relationships (family members, friends, and partner), satisfaction levels and the presence of feelings of loneliness and abandonment.

Procedure

The homeless women were contacted in shelters for the homeless, in other facilities providing care for this group (e.g. temporary resources for the winter), and on the street. The structured interview was carried out by a specialized team of interviewers trained in dealing with people in situations of social exclusion. After the aims and the confidentiality of the study were explained (i.e. all the interviews were conducted voluntarily and anonymously), the participants were asked for their informed consent and the interviewer confirmed their compliance with the inclusion and exclusion criteria. In order to ensure confidentiality and anonymity, the interviews were conducted in private places: offices lent by the shelters, places away from crowds in the street, bedrooms, etc.

Data Analysis

Following the procedure of Muñoz et al. (2005) and Hair et al. (2014) recommendations, the analyses were conducted in three successive steps.

Firstly, a non-hierarchical cluster analysis (i.e. k-means) was carried out to classify the homeless women on the basis of their SLEs and to test whether the 3-cluster structure found in Muñoz et al. (2005) was replicated in our sample of women. The different SLEs were used as dummy variables in the analysis (i.e. SLE absence [0] or presence [1]), employing a maximum of ten iterations and zero as convergence criteria. Three criteria were used to validate whether the right number of clusters had been extracted: a) the achievement of stability between clusters before ten iterations; b) the classification of a sufficient number of cases in each cluster; and c) the performance of a one-way ANOVA using the cluster membership variable to analyze the post-hoc matching between clusters for each SLE in the model.

Secondly, discriminant analysis was conducted to estimate the probability of cluster membership based on SLEs as predictor variables with a view, trying to answering the question: How well do SLEs predict which cluster the homeless women are from? Discriminant analysis was carried out on those SLEs that were significant in the previous

cluster analysis. Stepwise method and Mahalanobis distance (i.e. entry criteria [F=3.84] and removal criteria [F=2.71]) were used to choose the SLEs in successive steps.

Finally, one-way ANOVA (for continuous variables) and chi-square test (for nominal variables) were performed to analyze the characteristics distinguishing the three SLE clusters, including sociodemographic factors, homelessness trajectory, physical and mental health, and social support variables. For all the analyses: 1) power analysis and effect sizes were calculated using Partial Eta Squared (μ^2_p) for quantitative variables and Gamma Test (G) for qualitative data; and 2) pairwise Bonferroni corrected comparisons were used for post-hoc analysis. All the analyses were carried out using SPSS v.25.

Results

Cluster Analysis Results

The k-means cluster analysis revealed that the three-cluster solution was theoretically and structurally meaningful. The model converged at 5 iterations (i.e. no changes were found between cluster A, B and C after the fifth iteration), indicating that this three-cluster model was stable. Table 1 shows the final cluster center values (i.e. the relative amplitude of the center of each cluster) and the ANOVA F cluster analysis scores (i.e. relative weight given to a particular SLE) for all the significant SLEs included in the three resulting clusters. Both measures were used to determine which Cluster A SLE was allocated to. The F value was very high for most of the SLEs included in the model, suggesting that most SLEs had a significant impact on determining which Cluster A homeless woman would belong to. According to the ANOVA analysis, the following SLEs were not significant in forming the clusters: Father's and/or mother's death, divorce, unemployment problems, economic problems, moving because of work, losing housing due to eviction/demolition, emigrated from original country, left partner and/or children in their place of origin, and being a single mother.

Table 1: Final cluster centers and ANOVA cluster analysis for the SLEs included in the three resulting clusters.

SLE	Cluster A	Cluster B	Cluster C	$F_{(2, 113)}$
Economic problems	0.16	0.67	0.33	14.39***
Unemployment problems	0.16	0.42	0.15	5.03**
Parental physical/mental disability	0.21	0.52	0.37	4.53*
Parental drug/alcohol use	0.09	0.73	0.26	29.64***
A parent left family home	0.13	0.64	0.15	19.76***
Parental fights/argument	0.07	0.94	0.30	79.73***
Mother´s abuse by partner	0.09	0.91	0.04	113.66***
Family violence problems	0.16	0.82	0.26	30.13***
Conflicts between her and family	0.16	0.61	0.22	12.20***
Changes of residence	0.07	0.30	0.22	4.42*
Away from home	0.04	0.67	0.15	38.23***
Ran away from home	0.16	0.48	0.44	6.88**
Parents divorced	0.16	0.61	0.11	15.84***
Brought up by other people	0.14	0.55	0.41	9.54***
Out of school (dropped out or expelled)	0.23	0.55	0.37	4.73*
Abuse before age 18	0.18	0.79	0.33	22.38***
Sexual abuse before age 18	0.05	0.55	0.41	18.14***
Illness or injury	0.38	0.58	0.67	3.77*
Alcohol use	0.16	0.52	0.52	9.20***
Drug use	0.04	0.58	0.74	42.20***
Served jail sentence	0.05	0.30	0.44	10.76***
Admitted psychiatric hospital	0.20	0.52	0.19	6.56**
Mental health problem	0.25	0.55	0.41	4.17*
Sexual violence after age 18	0.13	0.58	0.44	12.73***

Abuse by partner	0.39	0.73	0.78	8.58***
Physical violence after age 18	0.29	0.73	0.85	19.56***
Suicide attempt	0.11	0.73	0.85	49.73***
Reported to the police	0.09	0.52	0.70	24.79***
Arrested for a crime	0.05	0.52	0.78	38.60***
Convicted of a crime	0.05	0.39	0.41	11.40***
Pregnant without wishing to	0.30	0.52	0.78	9.53***
Underwent an abortion	0.25	0.33	0.59	5.00**
Miscarriage	0.16	0.24	0.41	3.11*
Separation from a child	0.13	0.52	0.63	15.98***

$*p < .05$; $**p < .01$; $***p < .001$.
Note: 0 = non-occurrence; 1 = occurrence.

Table 1 shows the main characteristics of the three-cluster solution found in the analysis (see also Supplementary Figure 1 for a visual representation and Supplementary Table 4 for a subgroup characterization). The interpretation of the differences between clusters was complemented by the Bonferroni-corrected post-hoc test between clusters for each SLE after a one-way ANOVA using the cluster membership variable. Thus, the final cluster characterization was:

Cluster A profile "Shorter homelessness trajectories and best functioning": This cluster consisted of 56 homeless women (48.3% of the sample) and was distinguished from the other two clusters by the low levels of SLEs, both childhood/adolescence and throughout life.

Cluster B profile "Early onset of homelessness and rapid deterioration": This cluster consisted of 33 homeless women (28.4% of the sample) and was characterized by a higher prevalence of childhood and adolescence SLEs than the other two clusters, specifically events related to economic problems during childhood, problems of family violence (including being abused before the age of 18, parental fights and arguments, maternal abuse by the partner and conflicts with their family), parental divorce, a parent leaving the family home, away from home (abandonment or expulsion), and parental drug and/or alcohol use.

Cluster C profile "Revolving door to homelessness and late deterioration": The third cluster consisted of 27 homeless women (23.3% of the sample) and was characterized by a higher prevalence of typically adulthood SLEs, such as being arrested for a crime, being reported to the police, having served a jail sentence, and drug use. Furthermore, cluster C was also characterized by women-specific SLEs, such as undesired pregnancy, abortion or miscarriage, or separation from a child.

When SLE sums were analyzed, it was found that there were significant differences between the three clusters in the number of childhood SLEs ($F_{(2, 113)} = 119.61$; $p < .05$; $\mu^2_p = .68$; $1\text{-}\beta = 1.00$), in the number of life-long SLEs ($F_{(2, 113)} = 50.35$; $p < .05$; $\mu^2_p = .47$; $1\text{-}\beta = 1.00$), in the total number of SLEs ($F_{(2, 113)} = 114.99$; $p < .05$; $\mu^2_p = .67$; $1\text{-}\beta = 1.00$), and in the number of SLEs before becoming homeless ($F_{(2, 113)} = 9.52$; $p < .05$; $\mu^2_p = .14$; $1\text{-}\beta = 0.98$). Bonferroni corrected post-hoc analysis indicated that Cluster B had a significantly greater number of childhood SLEs and a higher total number of SLEs, whereas cluster C had a significantly greater number of life-long SLEs. Furthermore, clusters B and C had a significantly greater number of SLEs before becoming homeless than cluster A, but no significant differences were found between clusters B and C.

Discriminant Analysis Results

In order to estimate membership probability and to identify the best SLE predictors for each cluster, a discriminant analysis was carried out on those SLEs that were significant in the previous cluster analysis together with three sociodemographic variables: age, duration of homelessness and nationality. These sociodemographic variables were coded in line with the categories of Muñoz et al. (2005) in order to replicate the same model. Testing of the basic assumptions of the discriminant analysis showed that the multivariate normality assumption was not met (Box's M = 165.65; $p < .01$). However, the logarithms of the determinant values for the three clusters were quite close and all tolerance values were greater than .80, indicating that the variables were not multicolinear (i.e. overlapping in their ability to predict which homeless woman is grouped in each cluster).

The ANOVA group mean equality test revealed that there were significant differences for all SLEs except miscarriage. However, age and nationality were not significant while only duration of homelessness was a significant predictor in the model. Mahalanobis distance (D^2) showed that twelve steps were necessary to determine the variables included in the final predictive model. Wilk's lambda yielded two significant functions, summarized in Table 2. Function 1 had a higher eigenvalue and greater canonical correlation, which indicated a better data fit to the Function 1 model. Moreover, Supplementary Table 3 shows the structure matrix for each discriminant function. Loadings greater than .30 in absolute value were taken to be significant predictors for each function.

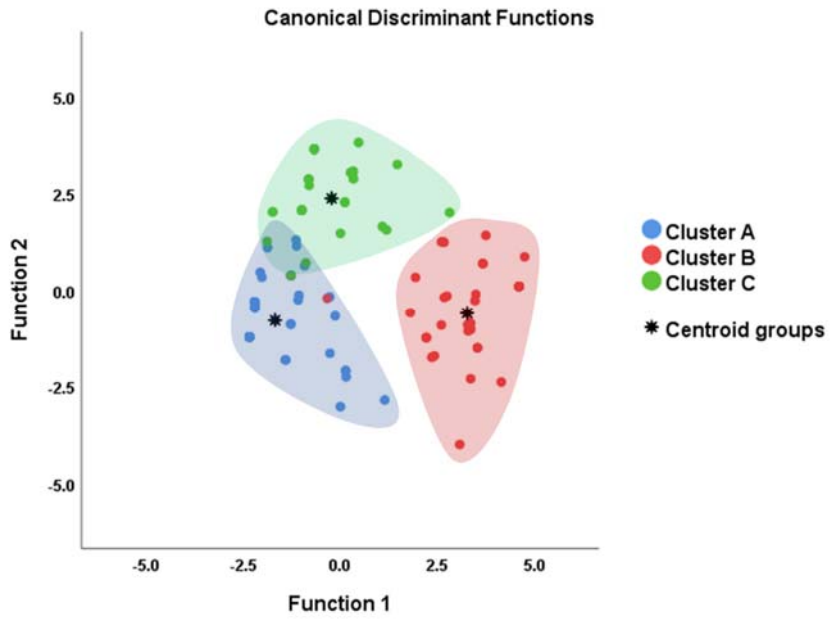
Table 2: Summary of canonical discriminant functions.

					Centroid groups for each function		
	Wilk's lambda	Eigenvalue	$R_{canonical}$	$R^2_{canonical}$	Cluster A	Cluster B	Cluster C
Function 1	.07*	4.43	.90	.81	-1.68	3.27	-0.23
Function 2	.36*	1.78	.80	.64	-0.79	-0.60	2.38

* $p < .001$

Figure 1 represents the canonical discriminant functions and shows that the three cluster center are quite separated and to visualize how different each homeless woman is from the rest, in terms of her SLEs. An average of 92.2% of homeless women were correctly classified into the three clusters with the aid of these two functions: Cluster A classified 92.9 % of the homeless women correctly on the basis of their SLEs, Cluster B 97% and Cluster C 85.2%; thus the highest percentage of correct classification was in Cluster B and the lowest in Cluster C. Furthermore, the classification results were substantially different from random classification, showing a 25% improvement: random prediction was 49.5% for Cluster A, 27.1% for Cluster B and 23.4% for Cluster C.

Figure 1: Canonical discriminant functions.



Subgroup Characterization

Finally, in order to characterize the differences between the resulting clusters, ANOVA and Chi-square tests were performed to compare sociodemographic, homeless trajectory, physical and mental health, and social support variables among the three clusters.

Sociodemographic and homelessness trajectory

Firstly, the sociodemographic and homeless trajectory variables were analyzed. No significant differences were found among the three clusters for mean age ($F_{(2, 113)}$ = 2.54; $p > .05$) and nationality ($\chi^2_{(4)}$ =.29; $p > .05$). However, significant differences among the three clusters were found for all the homeless trajectory variables:

1) Age became homelessness ($F_{(2, 107)}$ = 7.73; $p < .05$; μ^2_p = .13; 1-β = .94). Bonferroni corrected post-hoc analysis indicated that Cluster A (M = 43.50 years old; SD = 14.94) became homeless significantly later than clusters B (M = 32.48 years old; SD = 14.32) and C (M = 34.19 years old; SD = 9.98). No significant differences were found between clusters B and C.

2) Total time homeless ($F_{(2, 104)}$ = 7.06; $p < .05$; μ^2_p = .12; 1-β = .92). Bonferroni corrected post-hoc analysis indicated that Cluster A (M = 42.70 months; SD = 56.21) had been homeless for M = 42.70 months; SD = 56.21 significantly less time than clusters B (M = 97.00 months; SD = 103.38) and C (M = 101.04 months; SD = 81.59). No significant differences were found between clusters B and C.

3) Number of times homeless ($\chi^2_{(4)}$ =13.74; $p < .05$; G = .42): The percentage of women with one homeless episode was higher in cluster A, while the percentage for more than five homeless episodes was higher in cluster C. However, no significant differences were found between clusters in feeling discriminated because of homelessness ($\chi^2_{(6)}$ =3.98; $p > .05$).

General Health

Secondly, general health variables were analyzed. Significant differences between the three clusters were found in the perception of general health (($\chi^2_{(4)}$ =10.83; $p < .05$; G = .12) where the percentages of women with "bad or very bad" health was higher in Cluster B (34.4%). However, Cluster C showed a significantly higher prevalence (70.4%) of clinically diagnosed serious or chronic illness ($\chi^2_{(4)}$ =8.47; $p < .05$; G = .44) and a higher percentage (96.3%) of physical pain or discomfort ($\chi^2_{(4)}$ =16.11; $p < .05$; G = .67).

The analysis of the physical illness diagnoses showed that cluster C members were in a poorer state of health: asthma (44.4%; $\chi^2_{(2)}$ =12.87; $p < .05$; G = .54), rheumatoid arthritis (29.6%; $\chi^2_{(2)}$ =6.20; $p < .05$; G = .39), chronic back pain (55.6%; $\chi^2_{(2)}$ =6.65; $p < .05$; G = .39), injuries due to accidents (55.6%; $\chi^2_{(2)}$ =13.61; $p < .05$; G = .53), and HIV/AIDS (33.3%; $\chi^2_{(2)}$ =13.10; $p < .05$; G = .64). Furthermore, there was also a significantly higher percentage of disabilities (63%; $\chi^2_{(2)}$ =13.84; $p < .05$; G = .55) in Cluster C.

Mental Health

Coinciding with the data reported in the SLEs section, Cluster B members were found to have significantly more mental health problems. There was a higher prevalence of current diagnoses of anxiety (78.1%; $\chi^2_{(2)}$ =12.12; $p < .05$; G = .37), depression (71.9%;

$\chi^2_{(2)}$ =9.65; $p < .05$; $G = .30$) and other mental health problems (40.6%; $\chi^2_{(2)}$ =19.49; $p < .05$; $G = .49$). The GHQ-28 scores were also analyzed to evaluate the differences between the three clusters in psychiatric morbidity over the preceding month. There were significant differences between clusters for somatic symptoms ($F_{(2, 101)} = 4.22$; $p < .05$; $\mu^2_p = .08$; $1\text{-}\beta = 0.73$), anxiety symptoms ($F_{(2, 101)} = 44.36$; $p < .05$; $\mu^2_p = .08$; $1\text{-}\beta = 0.74$), depression symptoms ($F_{(2, 101)} = 8.20$; $p < .05$; $\mu^2_p = .14$; $1\text{-}\beta = 0.96$) and the total score ($F_{(2, 101)} = 6.60$; $p < .05$; $\mu^2_p = .12$; $1\text{-}\beta = 0.90$). However, no differences were found for social dysfunction symptoms ($F_{(2, 101)} = 2.22$; $p > .05$). Bonferroni corrected post-hoc analysis indicated that Cluster B and C had significantly higher psychiatric symptoms in all the GHQ factors than cluster A, but no significant differences were found between clusters B and C. In general, Cluster A was found to have a significantly lower prevalence of physical and mental health problems.

Alcohol and substances consumption

Total scores for the AUDIT and DAST scales were used to analyze the differences between the three clusters in relation to alcohol and substances consumption. Firstly, significant differences between clusters were found in alcohol consumption ($F_{(2, 79)} = 3.67$; $p < .05$; $\mu^2_p = .09$; $1\text{-}\beta = 0.76$): Cluster B had the highest scores for alcohol consumption. Bonferroni corrected post-hoc analysis indicated that Cluster B was significantly higher than cluster A, but no significant differences were found between clusters B and C. Secondly, significant differences between the clusters were also found for substance consumption ($F_{(2, 79)} = 7.60$; $p < .05$; $\mu^2_p = .16$; $1\text{-}\beta = 0.94$): Cluster C had the highest score for substance consumption. Bonferroni corrected post-hoc analysis indicated that Cluster C was significantly higher than Cluster A, but no significant differences were found between Clusters B and C. Finally, there were also significant differences between clusters in relation to polydrug use ($F_{(2, 79)} = 7.18$; $p < .05$; $\mu^2_p = .15$; $1\text{-}\beta = 0.93$). Bonferroni corrected post-hoc analysis indicated that Clusters B and C were significantly higher than Cluster A, but no significant differences were found between Clusters B and C.

Social support

As for social support variables, no significant differences between the clusters were found for "currently have family" ($\chi^2_{(2)}$ =2.28; $p > .05$), "currently have non-homeless friends" ($\chi^2_{(2)}$ =.68; $p > .05$), and "currently have homeless friends" ($\chi^2_{(2)}$ =.03; $p > .05$). However, Cluster C members had significantly more "currently have spouse/partner/significant other" than the other two clusters (63%; $\chi^2_{(2)}$ =8.74; $p < .05$; $G = .38$). Furthermore, no significant differences between clusters were found for the degree of satisfaction with their relationship with their partner, family and friends. On the other hand, no significant differences between clusters were found for "feel alone or abandoned" ($\chi^2_{(6)}$ =8.64; $p > .05$), "have someone to talk to in case you are sad or overwhelmed" ($\chi^2_{(6)}$ =4.94; $p > .05$) or "have someone to count on in case of hardship or need" ($\chi^2_{(6)}$ =.46; $p > .05$).

Discussion

Taking into account the fact that homeless women experience different types and numbers of SLEs than their male counterparts (Rodriguez-Moreno et al., unpublished), as well as their idiosyncratic characteristics (Duke & Searby, 2019), the general aim of this study was to examine the individual differences in SLEs in a sample of homeless women in Madrid (Spain).

The first aim of the study was to use cluster analysis to organize the sample of homeless women into different subgroups on the basis of their SLEs. The k-means cluster analysis showed that the three-cluster solution was theoretically and structurally meaningful. Our sample of homeless women could be organized into three clusters based on their SLE. 1) A first cluster (Cluster A = 48.3%) was characterized by low levels of SLEs, both childhood/adolescence and life-long. 2) A second cluster (Cluster B = 28.4%) was characterized by a higher prevalence of childhood and adolescence SLEs than the other two clusters, specifically those events related to economic problems during childhood, problems of family violence problems (including being abused before the age of 18, parental fights and arguments, maternal abuse at the hands of their partner, and conflicts with their family), divorced parents, a parent leaving the family home, being away from home (abandonment or expulsion), and parents with drug or alcohol problems. Furthermore, Cluster B was also characterized by SLEs related to mental health such as mental health problems and psychiatric hospital admissions. 3) A third cluster (Cluster C = 23.3%) was characterized by a higher prevalence of typically adulthood SLEs, such as being arrested for a crime, being reported to the police, having served a jail sentence and drug use. Moreover, Cluster C also yielded a higher percentage of women-specific SLEs such as undesired pregnancy, abortion and miscarriage, or separation from a child.

Secondly, discriminant analysis was carried out to examine whether the different SLEs could be used to predict the group membership. The results revealed that there were significant differences for almost all the SLEs; however, age and nationality were not significant and only duration of homelessness was a significant predictor in the model. The canonical discriminant function showed that the three cluster centers were quite separate, with an average of 92.2% of homeless women being correctly classified into the three clusters with these two functions: Cluster A would be right 92.9% of the times you classified a homeless woman based on hers SLEs, Cluster B would be right 97% of the times and Cluster C would be right 85.2% of the times. The highest percentage of correct classification was in Cluster B and the lowest in Cluster C. Furthermore, the classification results were substantially different from those for random classification.

Finally, the third objective was to characterize the differences between the resulting clusters and analyze whether there were significant differences between the three resulting clusters in sociodemographic, homeless trajectory, physical and mental health, and social support variables.

Both typologically and in percentage terms, the results of this study are very similar to those obtained by Muñoz et al. (2005), who found that a general sample of homeless people (87% were men) could also be organized into very similar subgroups based on their SLE.

Cluster A in this study also resembles Cluster A in Muñoz et al. (2005). Cluster A would be the "Shorter homelessness trajectories and best functioning" subgroup, characterized by low levels of SLEs, a shorter homeless trajectory, a lesser prevalence of physical and mental health problems and lower rates of alcohol and substance

consumption. This cluster also coincides with some subgroups found in previous studies (Humphreys & Rosenheck, 1998; Morse, 1992; Mowbray et al., 1993), the results of which can thus be extended to homeless women. Interestingly, Cluster A was the largest subgroup in the study, demystifying the stereotype that all homeless people have mental health problems and substance abuse consumption (Vázquez et al., 2017).

Cluster B in this study is similar to Cluster C in Muñoz et al. (2005). Cluster B would be the "Early onset of homelessness and rapid deterioration" subgroup, characterized by a large number of SLEs, with particular concentrations in childhood and a greater number of SLEs before the onset of homelessness. This concentration of SLEs in childhood was related to an early onset of homelessness and a greater chronification of homelessness. Furthermore, Cluster B members had significantly more mental health problems and the highest levels of alcohol consumption and polydrug use. This cluster also has several features in common with the "multiproblem group" in Humphreys & Rosenheck (1998) and with previous studies which formed subgroups characterized by mental illness (Mowbray et al., 1993). These results corroborate the suggestion of previous studies that there is a relation between childhood SLEs, mental health problems, alcohol consumption and homelessness (Chambers et al., 2014; Rodriguez-Moreno et al., unpublished).

Finally, Cluster C in our study resembles Cluster B in Muñoz et al. (2005). Cluster C would be the "Revolving door to homelessness and late deterioration" subgroup, mainly characterized by a higher prevalence of typically adulthood SLEs as well as some women-specific SLEs. Cluster C also has an early onset of homelessness and a greater chronification of homelessness, but Cluster C members had been homeless a significantly greater number of times than their counterparts in the other two clusters, which is an indicator of the "revolving door to homelessness" (Roca et al., 2019). Whereas Cluster B was characterized by mental health problems and alcohol consumption, Cluster C was characterized by physical health problems, disabilities and substance consumption. Previous studies have also suggested the relation between SLEs, physical health problems, substance consumption and homelessness (Muñoz et al., 2005). Furthermore, in this cluster there were higher rates for spouse/partner/significant other than in the other two clusters.

This study also confirms the key role of SLEs in originating and maintaining situations of homelessness (Muñoz et al., 1999; Roca et al., 2019) and the differences between childhood and adulthood SLE patterns (Rodriguez-Moreno et al., unpublished) as reflected in differences between the three clusters in the age at which homelessness begins, the total homelessness time, and in the number of times homeless in relation to the situation between the three clusters depending on the type of SLEs experienced.

However, there were two discrepancies with respect to the study of Muñoz et al. (2005), which included homeless men (86.9%) and women (13.1%). Firstly, in our study of homeless women we found no significant age differences between the clusters, while they found that Cluster B was significantly older than the other two clusters. Secondly, with regard to the relationship between health problems and substance consumption in the different clusters, our study found that the "Early onset of homelessness and rapid deterioration" subgroup (Cluster B) was characterized by mental health problems and alcohol consumption, while the "Revolving door to homelessness and late deterioration" subgroup (Cluster C) was characterized by physical health problems, disabilities (including physical, sensory and mental) and substances consumption. Our study's clearly differentiated pattern in homeless women seems to be more diffuse than in Muñoz et al.

(2005), who found no differences between Clusters B and C in terms of alcohol-related problems.

These results have several practical implications. By enhancing our knowledge of the characteristics and needs of the different subgroups of homeless women on the basis of their SLEs, there could be improvements in the design of psychological interventions and social services sensitive to the different profiles (Tsai, et al., 2014). More specifically, according to our findings, interventions targeting Cluster A members should take into account that as general functioning is preserved, homelessness and employment should be the main targets of the social and community-based programs. However, interventions targeting Cluster B members of should tackle childhood victimization, mental health problems and alcohol consumption, which may lead to the early onset of homelessness and the subsequent chronification. Although housing needs should be the main response to homelessness (regardless of the cluster in which they are classified), the empirical evidence seems to indicate that housing programs are especially important in early stages of homelessness to prevent the subsequent chronification. For instance, Housing First programs have shown to be a cost-effective alternative to the traditional emergency shelters and transitional housing progression (Tsemberis, 2010). Importantly, such programs have shown to be more effective when are designed considering the specific needs and characteristics of homeless women (Oudshoorn et al., 2018). Finally, interventions targeting Cluster C members should take into account women-specific SLEs, lack of stability due to multiple entrances and exits from homelessness, physical health problems, disabilities and substance consumption, which means sanitary and health care should be foregrounded. Regarding the housing needs of Cluster C members, it would be crucial to improve the "housing stabilization", enhancing the factors that have fostered the social integration of the individual and analyzing the role of physical health problems, disabilities and substance abuse in the revolving door to homelessness (Roca et al., 2019).

Accordingly, interventions designed for one subgroup may not be efficient for another subgroup. For instance, it would be ineffective to allocate time and resources to dealing with alcohol and substance consumption among Cluster A members, or to set as a primary objective the reintegration in the labor market of Cluster B members, whose problems of mental health and alcohol consumption might need to be well addressed before pursuing other goals of social inclusion. For instance, in the last few years, transdiagnostic protocols for homeless people have been developed to address the high rates of mental health problems and comorbidity in this population (Sauer-Zavala et al., 2019).

This study has some methodological limitations which should be born in mind when interpreting the results. Although our sample represents around 34% of the homeless women in the Madrid census, the sample size was limited for the purposes of the multivariate analyses used in the study. Even so, the analyses seem to be robust and replicate those of previous studies in the field. Secondly, Finite Mixture Models in general, and Latent Class Analysis (LCA) in particular, has gained popularity in the last years because of its many methodological strengths when classifying individuals into clusters (Haughton et al., 2009). Taking into account that our study seeks to replicate the three cluster solutions found in Muñoz et al. (2005), and that k-means is still a robust method for clustering dichotomous data (Brusco et al., 2017), we finally decided that k-means was the best approach in our case. However, future studies should explore the potential use of LCA for identifying homeless population subgroups. Thirdly, despite the wide range of SLEs included in the study, some areas may benefit from deeper analysis

in the future, such as women-related or mental illness events. Finally, only cross-sectional data were included in the study; future studies should include longitudinal information to clarify how these subgroups change over time as a consequence of homelessness.

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ANNEX:

SUPPLEMENTARY

MATERIALS

Method

Measures

Supplementary Table 1.

Stressful life events in childhood and adolescence (before 18 years old)
Major financial problems
Prolonged unemployment of a member of their family
A parent had a physically incapacitating health problem
A parent had a serious mental health problem
A parent had problems with alcohol
A parent had problems with drugs
A parent left the family home
Serious fights and arguments between the parents
Her mother was abused by her partner
Problems of family violence
One of her parents was in prison
Serious conflicts between her and someone in your family
Frequent changes of residence
Thrown out of home
She was abandoned
Ran away from home
Parents divorced or separated
Brought up by people other than their parents
Housing problems in childhood (eviction, inadequate housing conditions, etc.)
Dropped out of school
Expelled from school
Suffered from abuse
Suffered from sexual abuse

Supplementary Table 2.

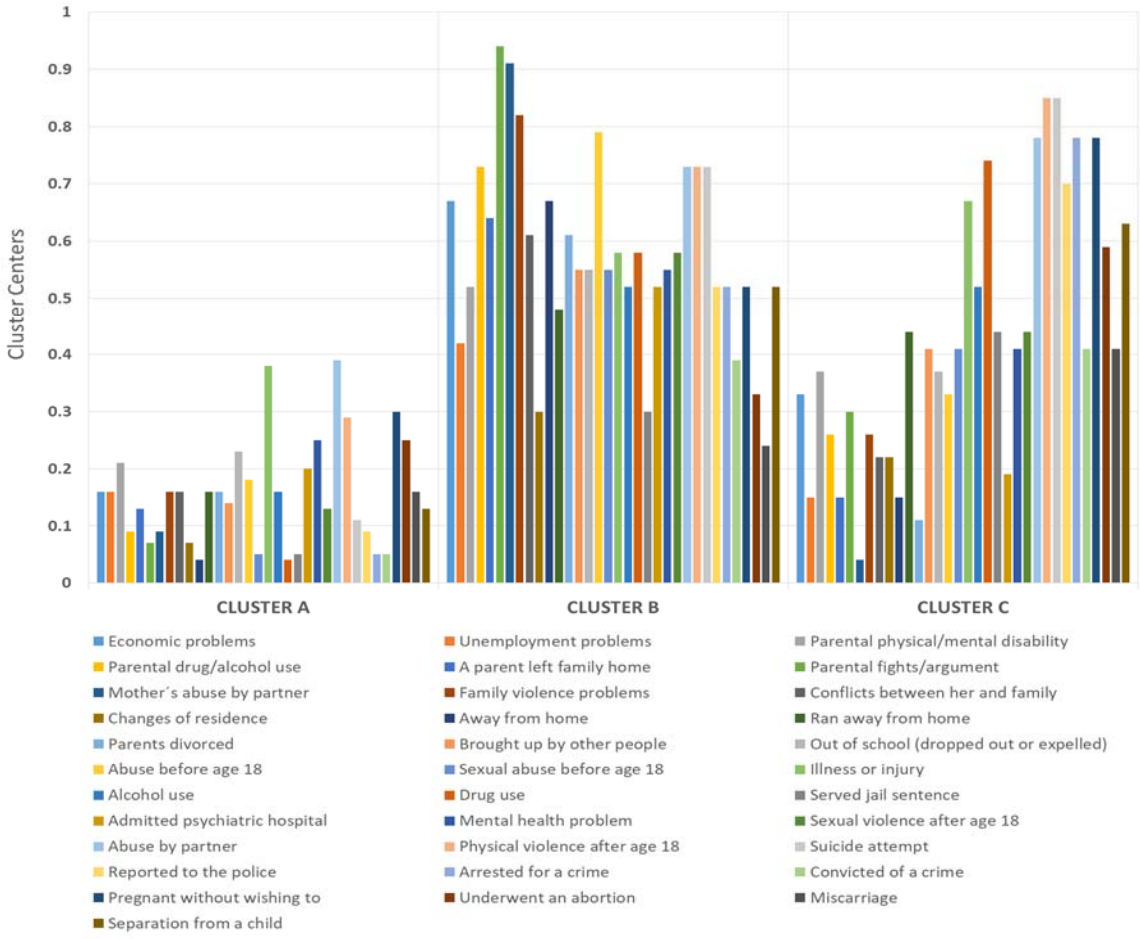
Stressful life events throughout life (after 18 years old)
Death of father
Death of mother
Death of spouse or partner
Death of a child
Suffered from a serious illness, injury or accident
Separation or divorce from spouse
Suffered from serious unemployment problems
Suffered from major financial problems
Drunk too much at some point in her life
Abused drugs at some point in her life
Been in prison
Admitted to a psychiatric hospital
Done work that separated her from her home
Lost her home due to eviction
Emigrated from her country of origin
Left her partner and/or children in their place of origin
Had a serious mental health problem
Suffered from sexual assault (over 18 years old)
Suffered from abuse by her spouse or partner
Suffered from physical violence
Had Attempted Suicide
Reported to the police
Arrested or detained for a crime
Convicted of a crime
Became pregnant without wishing to
Underwent an abortion
Suffered from a miscarriage
Separation from a child (adoption, abandoned, etc.)
She was a single mother (without a partner)

Results

Cluster Analysis Results

In line with the data preprocessing criterion of Muñoz et al. (2005), only those SLEs with prevalences higher than 15% were included in the analysis to ensure the significance of the variables. Furthermore, some SLEs with lower prevalences were combined to preserve both events: a) “Parental physical/mental health problem” was the result of combining “a parent had a physically health problem” with “a parent had a mental health problem”; b) “Away from home” of combining “thrown out of home” with “was abandoned”; and c) “Lost your home” of combining “lost your home due to eviction” with “lost your home due to demolition”.

Supplementary Figure 1: Final cluster centers for the SLEs included in the three-cluster solution.



Supplementary Table 3: Structure matrix for each discriminant functions.

	Function 1	Function 2
Mother´s abuse by partner	0.65*	-0.36
Parental fights/argument	0.58*	-0.02
Family violence problems	0.54*	-0.10
Away from home	0.37*	-0.06
Conflicts between her and family	0.30*	0.07
Parental drug/alcohol use	0.29*	-0.01
A parent left family home	0.27*	-0.10
Abuse before age 18	0.21*	-0.01
Sexual abuse before age 18	0.21*	0.02
Parental physical/mental disability	0.16*	-0.04
Age	-0.14*	-0.09
Admitted psychiatric hospital	0.09*	0.01
Economic problems	0.09*	-0.01
Miscarriage	-0.07*	0.04
Unemployment problems	0.07*	-0.01
Suicide attempt	0.31	0.50*
Arrested for a crime	0.25	0.48*
Drug use	0.15	0.41*
Physical violence after age 18	0.19	0.31*
Convicted of a crime	-0.01	0.31*
Underwent an abortion	0.02	0.26*
Served jail sentence	0.10	0.26*
Illness or injury	0.08	0.25*
Abuse by partner	0.10	0.22*
Ran away from home	0.02	0.20*
Pregnant without wishing to	0.13	0.19*
Reported to the police	0.06	0.17*
Mental health problem	0.00	0.16*
Sexual violence after age 18	0.02	0.15*
Parents divorced	0.10	-0.14*
Separation from a child	0.07	0.13*
Changes of residence	-0.01	0.11*
Duration of homelessness	0.09	0.10*
Brought up by other people	0.07	-0.09*
Alcohol use	0.00	-0.07*
Out of school (dropped out or expelled)	-0.02	-0.04*
Nationality	-0.03	-0.03*

Subgroup Characterization

Stressful Live Events

Secondly, Supplementary Table 4 shows the differences in stressful live events among the three clusters. The percentage of childhood SLEs was significantly higher in Cluster B, which yielded a number of striking data: 66.7% of the women in this cluster experienced economic problems in their families; 72.7% had parents with drug or alcohol-related problems; 63.6% had experience of a parent leaving the family home; 93.9% of parental fights or arguments; 90.9% had experience of maternal abuse at the hands of partners; 81.8% had been victims of violence in their family; 60.6% had had conflicts with their families; 66.7% were away from home; 60.6% had divorced parents; and 78.8% were abused, 54.4% sexually before the age of 18. Cluster B was also characterized by SLEs related to mental health, such as mental health problems (54.4%) and psychiatric hospital admissions (51.5%).

As for the remaining SLEs, cluster C yielded a higher percentage of adulthood SLEs, such as drug use (74.1%), physical violence after 18 (85.2%), suicide attempt (85.2%), served jail sentences (44.4%), being reported to the police (70.4%) and being arrested for a crime (77.8%). Cluster C also had a higher percentage of women-specific SLEs, such as undesired pregnancy (77.8%), abortion (59.3%), miscarriage (40.7%) or separation from a child (63%). Finally, there were some SLEs for which Cluster B and C percentages were similar but significantly higher than in Cluster A (characterized by low levels for all SLEs): illness or injury, alcohol use, abuse by partner or criminal conviction.

Supplementary Table 4: Comparison of the three clusters in terms of Stressful Life Events (SLEs).

SLE	Cluster A % (n)	Cluster B % (n)	Cluster C % (n)	$\chi^2_{(2)}$
Economic problems	16.1 (9)	66.7 (22)	33.3 (9)	23.55***
Unemployment problems	16.1 (9)	42.4 (14)	14.8 (4)	9.49**
Parental physical/mental disability	21.4 (12)	51.5 (17)	37 (10)	8.61 *
Parental drug/alcohol use	8.9 (5)	72.7 (24)	25.9 (7)	39.92***
A parent left family home	12.5 (7)	63.6 (21)	14.8 (4)	30.05***
Parental fights/argument	7.1 (4)	93.9 (31)	29.6 (8)	67.89***
Mother´s abuse by partner	8.9 (5)	90.9 (30)	3.7 (1)	77.48***
Family violence problems	16.1 (9)	81.8 (27)	25.9 (7)	40.35***
Conflicts between her and family	16.1 (9)	60.6 (20)	22.2 (6)	20.60***
Changes of residence	7.1 (4)	30.3 (10)	22.2 (6)	8.42*
Away from home	3.6 (2)	66.7 (22)	14.8 (4)	46.81***
Ran away from home	16.1 (9)	48.5 (16)	44.4 (12)	12.59**
Parents divorced	16.1 (9)	60.6 (20)	11.1 (3)	25.40***
Brought up by other people	14.3 (8)	54.5 (18)	40.7 (11)	16.76***
Out of school (dropped out or expelled)	23.2 (13)	54.5 (18)	37 (10)	8.96*
Abuse before age 18	17.9 (10)	78.8 (26)	33.3 (9)	32.91***
Sexual abuse before age 18	5.4 (3)	54.5 (18)	40.7 (11)	28.20***
Illness or injury	37.5 (21)	57.6 (19)	66.7 (18)	7.26*
Alcohol use	16.1 (9)	51.5 (17)	51.9 (14)	16.25***
Drug use	3.6 (2)	57.6 (19)	74.1 (20)	49.60***
Served jail sentence	5.4 (3)	30.3 (10)	44.4 (12)	18.55***
Admitted psychiatric hospital	19.6 (11)	51.5 (17)	18.5 (5)	12.10**
Mental health problem	25 (14)	54.5 (18)	40.7 (11)	7.97*
Sexual violence after age 18	12.5 (7)	57.6 (19)	44.4 (12)	21.34***
Abuse by partner	39.3 (22)	72.7 (24)	77.8 (21)	15.30***
Physical violence after age 18	28.6 (16)	72.7 (24)	85.2 (23)	29.83***
Suicide attempt	10.7 (6)	72.7 (24)	85.2 (23)	54.30***
Reported to the police	8.9 (5)	51.5 (17)	70.4 (19)	35.37***
Arrested for a crime	5.4 (3)	51.5 (17)	77.8 (21)	47.10***
Convicted of a crime	5.4 (3)	39.4 (13)	40.7 (11)	19.48***
Pregnant without wishing to	30.4 (17)	51.5 (17)	77.8 (21)	16.74***
Underwent an abortion	25 (14)	33.3 (11)	59.3 (16)	9.44**
Miscarriage	16.1 (9)	24.2 (8)	40.7 (11)	6.06*
Separation from a child	12.5 (7)	51.5 (17)	63 (17)	25.58***

$*p < .05$; $**p < .01$; $***p < .001$.