

ORIGINAL ARTICLE

Loneliness and social isolation in people with HIV aged ≥ 50 years. The No One Alone (NOA)-GeSIDA study conducted by the GeSIDA 12021 study group

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Abstract

Introduction: There is a growing number of people with HIV who are aged 50 years or older, and the prevalence of loneliness and social isolation remains unknown.

Methods: A multicentre study was conducted across 22 GeSIDA centres. A survey was carried out to assess loneliness [UCLA 3-item Loneliness Scale-3 (UCLA-3)] and social isolation [Lubben Social Network Scale-Revised (LSNS-R)], along with sociodemographic aspects, HIV-related factors, comorbidities, tobacco, alcohol and drug consumption, quality of life, anxiety and depression, and stigma. The prevalence of loneliness (UCLA-3 ≥ 6) and evident social isolation (LSNS-R ≤ 20) was calculated, and multivariable multinomial logistic regression models were used to identify associated factors.

Results: A total of 399 people with HIV were included; 77.4% were men, of average age 59.9 years (SD 6.5); 45.1% were aged ≥ 60 years; 86% were born in Spain; 86.7% in urban areas; 56.4% with secondary or higher education; 4.5% living alone against their wishes. A total of 66.9% were infected through sexual transmission, with a median of 22.9 years since diagnosis [interquartile range (IQR): 12.6–29.5] and a median nadir CD4 count of 245 cells/ μ L (IQR: 89–440). Overall, 90.7% had viral load <50 copies/mL, 93.5% had adherence $>95\%$, and 26.3% had a prior AIDS diagnosis. In all, 29.1% and 21% reported significant symptoms of anxiety and depression, respectively, 24.3% had mobility issues, and 40.8% reported pain. Overall, 77.7% of participants reported neither loneliness nor social isolation, 10.0% loneliness only, 5.8% social isolation only and 6.5% both. Multivariable analyses identified that being aged 50–59, unemployed or retired, living alone unwillingly, single, poor quality of life, anxiety, and HIV-related stigma were associated with loneliness. Meanwhile, lower education, living alone unwillingly, and depressive symptoms were associated with social isolation. Individuals living alone unwillingly, with depressive symptoms and experiencing HIV-related stigma were at higher risk for both loneliness and social isolation.

Conclusions: There is a relatively high prevalence of loneliness and social isolation in our population. Living alone against one's wishes, being unmarried, and experiencing mobility issues could predispose individuals to feel lonely and socially isolated. Those with anxiety and stigma are more prone to loneliness, while individuals with depression are more predisposed to social isolation. It is necessary to develop strategies for the detection and management of loneliness and social isolation in people with HIV aged >50 years.

KEYWORDS

aging, HIV infection, loneliness, social isolation, stigma

INTRODUCTION

The life expectancy of people with HIV who receive antiretroviral therapy (ART) has notably increased over the past two decades [1, 2]. Consequently, there has been a

substantial increase in the number of people with HIV aged 50 years or older. A parameterized model from the Dutch national ATHENA cohort estimates that the proportion of people with HIV aged over 50 years of age will increase from 28% in 2010 to 73% by 2030 [3]. This

increase means that the needs of people with HIV and the type of care they receive are changing, with older people with HIV having more and earlier medical comorbidities than people living without HIV of the same age [4]. While a substantial number of studies have focused on medical comorbidities, there has been limited investigation into the psychosocial needs of this population [5, 6].

Social isolation (SIL) and loneliness are among the social factors with the greatest impact on quality of life in people with HIV [7, 8]. SIL is defined as a lack of social relationships or a low frequency of social contact, while loneliness is defined as the feeling that results from the perception of undesired SIL [9]. Although both variables could be associated, some individuals may experience loneliness even when they are not socially isolated, and some may feel lonely despite living with others [10].

The prevalence of loneliness and SIL increases with age [11], and the proposed causes include life events, such as retirement, loss of family or illness, that reduce mobility and social contact [12]. In the older general population, SIL and loneliness have been associated with health problems such as all-cause mortality, unhealthy habits and mental health issues [13–18]. The health impact of loneliness and SIL in older people with HIV seems to be greater than that in the general population [18, 19]. Thus, some models have proposed that social HIV stigma leads to SIL and loneliness, which predispose individuals to experiencing depressive symptoms [20–23]. Moreover, addressing loneliness and SIL in this population is particularly relevant because social stress associated with the effect of HIV could exacerbate chronic low-grade systemic inflammation [24–26]. Loneliness in people with HIV has also been associated with poorer antiretroviral adherence and poorer illness prognosis [27, 28].

Few studies have evaluated the prevalence of loneliness or SIL in older people with HIV [6, 29–34]. The prevalence of loneliness ranges from 13% to 58% [6, 29–34], depending on the cohort characteristics, the type of severity measured, and the evaluation tools employed. Studies of SIL are scarce, reporting a prevalence that ranges from 17.7% to 59% [18, 19] in older people with HIV, depending on the evaluation tools employed. To our knowledge, no studies have been conducted in this population in any European country.

Due to the increase in the life expectancy of people with HIV and the absence of studies in our country, the present study evaluated the prevalence of and factors associated with SIL and loneliness in a multicentre sample of older people with HIV.

MATERIALS AND METHODS

Study design, population and sample size

The NOA GeSIDA Study was an observational, cross-sectional, multicentre study conducted in 22 Spanish hospitals (September 2022–May 2023).

Eligible participants were any people with HIV aged 50 years or older who were actively followed at the participating centres. People with HIV with a life expectancy of less than 1 year were excluded based on the discretion of their referring physician. In Spain, the estimated number of people with HIV over 50 years of age ranges from 72 311 to 86 023 [35, 36], with the prevalence of loneliness and SIL within this group estimated between 39.7% and 58% [29–33]. Based on these figures, a minimum sample size of 368 people with HIV aged 50 or older was required to achieve a 95% confidence level and an accuracy of 5%.

Data collection procedure

The data were collected using a combination of methods, including self-reported information and comprehensive chart reviews of participants' medical records. Self-reported data were gathered through face-to-face interviews with researchers, as well as through self-administered questionnaires completed by the participants. Each method was carefully designed to ensure the accuracy and reliability of the data, enabling a thorough assessment of the participants' health status and the relevant variables for the study. We used Research Electronic Data Capture (REDCap) for data collection.

Sociodemographic information and medical history data were collected from the patients' medical records. Sociodemographic variables considered were age, sex at birth, place of birth, place of residence, educational status, employment status, personal status and marital status. Several variables related to HIV infection and other coinfections, such as the duration of HIV infection, route of acquisition, previous AIDS events, CD4 nadir, current CD4 count, current HIV viral load (undetectable at <50 copies/mL), hepatitis B virus (HBV) coinfection (HBsAg+) and hepatitis C virus (HCV) coinfection (RNA+), were also included. Adherence to treatment in the last 4 weeks was assessed through a self-report questionnaire. We also collected information on the following comorbidities [37]: cardiovascular diseases (arterial hypertension, claudication, cerebrovascular accident, congestive heart disease, angina pectoris, acute myocardial infarction),

digestive diseases (liver cirrhosis), endocrine diseases (type 2 diabetes mellitus, obesity, dyslipidaemia, metabolic syndrome), respiratory diseases (chronic obstructive pulmonary disease), osteoarticular diseases (osteoporosis, previous fracture), neuropsychiatric diseases (dementia, depression, anxiety, bipolar disorder/schizophrenia), nephrological diseases (chronic renal failure) and sensorineural deficits (hearing problems, the need for hearing aids and/or difficulty seeing despite wearing glasses). The information on comorbidities was managed by considering the number of comorbidities rather than addressing each comorbidity individually. Information on polypharmacy (the use of more than five drugs not related to ART) and was also collected.

Validated questionnaires and scales were employed to assess anxiety, depression, health-related quality of life, HIV-related stigma, as well as alcohol, tobacco and illicit drug use. Anxiety and depressive symptoms were evaluated by employing the HADS Depression-Anxiety Scale [38]. The HADS is a 14-item questionnaire that includes seven questions each for assessing anxiety and depressive symptoms. Anxiety and depression are scored separately, with the total score ranging from 0 to 21. A higher total score is associated with a greater degree of anxiety or depression. A score ≥ 8 points is strongly associated with anxiety or depression [38]. HIV-related stigma was evaluated by employing the Spanish version of the adapted HIV Stigma Scale [39], which includes 30 items, with a higher score indicating a greater perception of stigma. Patients' overall quality of life (QoL) was assessed using the five-level EQ-5D (EQ-5D-5L) [40, 41]. This scale has five dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression), with each dimension having five response options (no problems, slight problems, moderate problems, severe problems and extreme problems). The EQ-5D also includes a visual analogue scale (EQ-5D VAS) that assesses overall health. VAS scores range from 0 to 100, and higher scores indicate better health.

Alcohol consumption was assessed by the Alcohol Use Disorders Identification Test (AUDIT-C) scale [42] (How often do you have a drink containing alcohol? How many standard drinks containing alcohol do you have on a typical day when drinking? How often do you have six or more drinks on one occasion?). Each item is scored on a Likert-type scale ranging from 0 to 4 points, with higher scores indicating a greater risk of alcohol-related problems. Scores above 4 points for men and 3 points for women are considered to indicate risky alcohol consumption [42, 43]. Additionally, questions to assess the consumption of tobacco or other illegal drugs were employed.

Outcome variable

Individuals were classified into four groups based on their perception of loneliness and SIL: neither loneliness nor SIL, loneliness only, SIL only, and loneliness and SIL. Loneliness was measured using the UCLA 3-item Loneliness Scale-3 [44]. The three items are 'How often do you feel that you lack companionship?', 'How often do you feel left out?' and 'How often do you feel isolated from others?'. Each item is scored using a three-point response scale ranging from 'hardly ever or never' (1 point) to 'often' (3 points), and the total score is the sum of all item scores, with higher scores indicating a higher level of perceived loneliness. Individuals with a score of 6 or higher were considered to have loneliness. SIL was evaluated by the Lubben Social Network Scale-Revised (LSNS-R), a widely used instruments to assess perceived social support received from family and friends [45, 46]. The questionnaire consists of 12 items, six of which cover social networks with family and six with friends. Each of the 12 LSNS-R questions is scored from 0 to 5, like a Likert-scale, and the total score ranges from 0 to 60 points. Individuals with a score of 20 or lower were considered to be socially isolated.

Statistical analysis

We performed a descriptive analysis of sociodemographic, medical and psychological characteristics and drug use habits using frequency tables for categorical variables and means and standard deviations (SDs) or medians and interquartile ranges (IQRs) for quantitative variables with normal or non-normal distributions. We calculated the prevalence of loneliness and SIL globally and according to the characteristics of the study participants. We used multinomial logistic regression models to estimate relative risk ratios (RRRs) for the association between exposure variables and loneliness only, SIL only, and loneliness and SIL, compared with neither loneliness nor SIL. Only exposure variables that remained statistically significant ($p < 0.05$) after adjustment were included in the final multivariable model. To adjust for clustering of individuals within centres, we used robust methods to estimate standard errors and thus to calculate 95% confidence intervals and p -values. Internal consistency reliability was evaluated using Cronbach's alpha. A value >0.7 indicates acceptable internal consistency reliability [47]. Statistical analysis was performed with Stata software (version 17.0; Stata Corporation, College Station, TX, USA).

TABLE 1 Characteristics of 399 people with HIV included in the study.

Sociodemographic characteristics	
Sex at birth	
Male	309 (77.4)
Female	90 (22.6)
Age (years)	
Mean (SD)	59.9 (6.5)
50–59	219 (54.9)
≥60	180 (45.1)
Place of birth	
Spain	343 (86.0)
Non-Spain	55 (13.8)
Unknown	1 (0.2)
Place of residence	
Urban	346 (86.7)
Rural	53 (13.3)
Educational level	
Primary or lower	138 (34.6)
Secondary or higher	225 (56.4)
Unknown	36 (9.0)
Employment status	
Student/currently employed	185 (46.4)
Unemployed/retired/unknown	204 (51.1)
Unknown	10 (2.5)
Personal situation	
Not living alone/living alone by choice	348 (87.2)
Living alone unwillingly	18 (4.5)
Unknown	33 (8.3)
Marital status	
Married/in a relationship	176 (44.1)
Single	134 (33.6)
Separated/widowed	65 (16.3)
Unknown	24 (6.0)
Clinical characteristics	
Time since HIV diagnosis (years)	
Median (IQR)	22.9 (12.6–29.5)
<15	121 (30.3)
≥15	278 (69.7)
HIV acquisition route	
Heterosexual	115 (28.8)
Men who have sex with men	152 (38.1)
Intravenous drug users	87 (21.8)
Other/unknown	45 (11.3)

(Continues)

TABLE 1 (Continued)

CD4 nadir (cells/μL)	
Median (IQR)	245 (89–440)
<200	165 (41.3)
≥200	229 (57.4)
Unknown	5 (1.2)
CD4 count (cells/μL)	
Median (IQR)	708 (487–985)
<500	106 (26.6)
≥500	293 (73.4)
HIV-RNA <50 copies/mL	
No	36 (9.0)
Yes	362 (90.7)
Unknown	1 (0.2)
Previous AIDS event	
No	294 (73.7)
Yes	105 (26.3)
Hepatitis B coinfection (HBsAg+)	
No	379 (95.0)
Yes	18 (4.5)
Unknown	2 (0.5)
Hepatitis C coinfection (RNA+)	
No	270 (67.7)
Previous (cured)	122 (30.6)
Active	6 (1.5)
Unknown	1 (0.2)
ART adherence in the last 4 weeks	
>95%	373 (93.5)
≤95%	22 (5.5)
Unknown	4 (1.0)
Number of comorbidities	
0	101 (25.3)
1	91 (22.8)
2	91 (22.8)
≥3	116 (29.1)
Polypharmacy	
No	282 (70.7)
Yes	117 (29.3)
Tobacco, alcohol and drug consumption	
Ever a regular tobacco user	
No	79 (19.8)
Yes	319 (79.9)
Unknown	1 (0.2)

(Continues)

TABLE 1 (Continued)

Risky alcohol consumption	
No	275 (68.9)
Yes	47 (11.8)
Unknown	77 (19.3)
Drug use in the last year	
No	316 (79.2)
Yes	82 (20.5)
Unknown	1 (0.3)
Quality of life, anxiety, depression and self-reported HIV stigma	
EQ-5D VAS	
Mean (SD)	76.1 (19.8)
T1: 1–69	103 (25.8)
T2/T3: 70–100	293 (73.4)
Unknown	3 (0.8)
Clinically significant depression	
No	312 (78.2)
Yes	84 (21.0)
Unknown	3 (0.7)
Clinically significant anxiety	
No	281 (70.4)
Yes	116 (29.1)
Unknown	2 (0.5)
Total score HSS scale	
Mean (SD)	68.3 (19.0)
T1/T2: 30–76	256 (64.2)
T3: 77–120	129 (32.3)
Unknown	14 (3.5)

Abbreviations: ART, antiretroviral treatment; IQR, interquartile range; SD, standard deviation; T1, first tercile; T2, second tercile; T3, third tercile.

Ethics statement

This study was approved by the Institutional Research Ethics Committee [Comité de Ética de Investigación con medicamentos de La Rioja (CEImLAR)]. All participants provided written informed consent.

RESULTS

A total of 409 people with HIV agreed to participate in this study; 10 were excluded due to missing data on loneliness or the SIL scale score. Therefore, a total of 399 people with HIV aged ≥ 50 years were included in the present analysis.

Sociodemographic and clinical characteristics

The sociodemographic and clinical characteristics of the study population are shown in Table 1. Most of the participants were male, Spanish-born, living in an urban area, had completed secondary or university studies, were unemployed or retired and did not live alone or lived alone as a choice. Our participants were mostly diagnosed with HIV long ago, with 69.7% having been diagnosed more than 15 years ago. The main route of HIV acquisition was sexual, with 38.1% of the participants being men who had sex with men and 28.8% being heterosexual. The participants' current immunological status was good, and nearly all the participants had an undetectable viral load. Most of the people with HIV maintained optimal adherence, but 5.5% had an adherence rate less than 95% in the previous month. The sociodemographic and clinical characteristics of the participants in this study were comparable to those of adults aged 50 years or older living with HIV in Spain [48] (data not shown).

Internal consistency

The Cronbach's alpha for the different scales used was as follows: R-UCLA scale, 0.830; LUBBEN scale, 0.842; HADS scale, 0.896; HHSS scale, 0.924; EQ-5D scale, 0.795; and AUDIT-C scale, 0.274.

Tobacco, alcohol and drug consumption

Regarding tobacco, alcohol and drug consumption (Table 1), 79 (19.8%) participants had never smoked, and 151 (37.8%) had smoked in the past. Additionally, 133 (33.3%) participants were current daily smokers, while 35 (8.8%) smoked occasionally. A total of 47 (11.8%) participants had a score in the AUDIT-C scale suggesting alcohol-related problems. Moreover, 82 participants (20.5%) reported having consumed any illegal drug during the last year, with cannabis being the most commonly used (15.8%), followed by cocaine (5.0%) and heroin (1.2%).

Quality of life, anxiety, depression and self-reported HIV stigma

The mean EQ-5D VAS score was 76.1 (SD 19.8). In total, 24.3% of participants reported some mobility issues, 9.0% problems with self-care, 19.1% experienced difficulties performing daily activities, and 40.8% reported pain or

TABLE 2 Prevalence of loneliness and social isolation according to the characteristics of 399 people with HIV included in the study.

	Neither loneliness nor social isolation	Loneliness only	Social isolation only	Loneliness and social isolation	<i>p</i> -value
Overall	310 (77.7)	40 (10.0)	23 (5.8)	26 (6.5)	
Sociodemographic characteristics					
Sex at birth					0.081
Male	248 (80.3)	25 (8.1)	17 (5.5)	19 (6.1)	
Female	62 (68.9)	15 (16.7)	6 (6.7)	7 (7.8)	
Age (years)					0.108
50–59	168 (76.7)	28 (12.8)	9 (4.1)	14 (6.4)	
≥60	142 (78.9)	12 (6.7)	14 (7.8)	12 (6.7)	
Place of birth					0.708
Spain	267 (77.8)	37 (10.8)	19 (5.5)	20 (5.8)	
Non-Spain	42 (76.4)	3 (5.4)	4 (7.3)	6 (10.9)	
Place of residence					0.233
Urban	272 (78.6)	31 (9.0)	19 (5.5)	24 (6.9)	
Rural	38 (71.7)	9 (17.0)	4 (7.5)	2 (3.8)	
Educational level					0.036
Primary or lower	99 (71.7)	13 (9.4)	15 (10.9)	11 (8.0)	
Secondary or higher	184 (81.8)	23 (10.2)	5 (2.2)	13 (5.8)	
Employment status					0.069
Student/currently employed	157 (84.9)	13 (7.0)	7 (3.8)	8 (4.3)	
Unemployed/retired	145 (71.1)	26 (12.7)	15 (7.3)	18 (8.8)	
Personal situation					<0.001
Not living alone/living alone by choice	279 (80.2)	34 (9.8)	17 (4.9)	18 (5.2)	
Living alone unwillingly	5 (27.8)	3 (16.7)	4 (22.2)	6 (33.3)	
Marital status					0.042
Married/in a relationship	151 (85.8)	11 (6.2)	8 (4.5)	6 (3.4)	
Single	94 (70.1)	16 (11.9)	9 (6.7)	15 (11.2)	
Separated/widowed	47 (72.3)	11 (16.9)	4 (6.1)	3 (4.6)	
Clinical characteristics					
Time since HIV diagnosis (years)					0.338
<15	100 (82.6)	8 (6.6)	5 (4.1)	8 (6.6)	
≥15	210 (75.5)	32 (11.5)	18 (6.5)	18 (6.5)	
HIV acquisition route					0.147
Men who have sex with men	122 (80.3)	14 (9.2)	5 (3.3)	11 (7.2)	
Heterosexual	89 (77.4)	14 (12.2)	6 (5.2)	6 (5.2)	
Intravenous drug users	61 (70.1)	12 (13.8)	10 (11.5)	4 (4.6)	
CD4 nadir (cells/μL)					
<200					
≥200					
CD4 count (cells/μL)					0.921
<500	81 (76.4)	10 (9.4)	7 (6.6)	8 (7.5)	
≥500	229 (78.2)	30 (10.2)	16 (5.5)	18 (6.1)	

(Continues)

TABLE 2 (Continued)

	Neither loneliness nor social isolation	Loneliness only	Social isolation only	Loneliness and social isolation	p-value
HIV RNA <50 copies/mL					0.998
No	29 (80.6)	3 (8.3)	2 (5.6)	2 (5.6)	
Yes	280 (77.3)	37 (10.2)	21 (5.8)	24 (6.6)	
Prior AIDS event					0.811
No	232 (78.9)	28 (9.5)	16 (5.4)	18 (6.1)	
Yes	78 (74.3)	12 (11.4)	7 (6.7)	8 (7.6)	
Hepatitis B coinfection (HBsAg+)					0.996
No	294 (77.6)	38 (10.0)	22 (5.8)	25 (6.6)	
Yes	14 (77.8)	2 (11.1)	1 (5.6)	1 (5.6)	
Hepatitis C coinfection (RNA+)					0.373
No	218 (80.7)	24 (8.9)	11 (4.1)	17 (6.3)	
Previous (cured)	86 (70.5)	16 (13.1)	12 (9.8)	8 (6.6)	
Active	5 (83.3)	0	0	1 (16.7)	
ART adherence in the last 4 weeks					0.089
>95%	290 (77.7)	34 (9.1)	23 (6.2)	26 (7.0)	
≤95%	16 (72.7)	6 (27.3)	0	0	
Number of comorbidities					0.526
0	83 (82.2)	7 (6.9)	4 (4.0)	7 (6.9)	
1	71 (78.0)	7 (7.7)	4 (4.4)	9 (9.9)	
2	71 (78.0)	10 (11.0)	6 (6.6)	4 (4.4)	
≥3	85 (73.3)	16 (13.8)	9 (7.8)	6 (5.2)	
Polypharmacy					0.127
No	228 (80.8)	25 (8.9)	14 (5.0)	15 (5.3)	
Yes	82 (70.1)	15 (12.8)	9 (7.7)	11 (9.4)	
Tobacco, alcohol, and drug consumption					
Ever a regular tobacco user					0.990
No	63 (79.7)	7 (8.9)	5 (6.3)	4 (5.1)	
Yes	246 (77.1)	33 (10.3)	18 (5.6)	22 (6.9)	
Risky alcohol consumption					0.670
No	213 (77.4)	28 (10.2)	18 (6.5)	16 (5.8)	
Yes	34 (72.3)	7 (14.9)	2 (4.3)	4 (8.5)	
Drug use in the last year					0.104
No	250 (79.1)	29 (9.2)	18 (5.7)	19 (6.0)	
Yes	60 (73.2)	10 (12.2)	5 (6.1)	7 (8.5)	
Quality of life, anxiety, depression and self-reported HIV stigma					
EQ-5D VAS					<0.001
T1: 1–69	61 (59.2)	20 (19.4)	7 (6.8)	15 (14.6)	
T2/T3: 70–100	246 (84.0)	20 (6.8)	16 (5.5)	11 (3.7)	
Clinically significant depression					<0.001
No	265 (84.9)	25 (8.0)	14 (4.5)	8 (2.6)	
Yes	43 (51.2)	14 (16.7)	9 (10.7)	18 (21.4)	

TABLE 2 (Continued)

	Neither loneliness nor social isolation	Loneliness only	Social isolation only	Loneliness and social isolation	<i>p</i> -value
Clinically significant anxiety					<0.001
No	243 (86.5)	12 (4.3)	16 (5.7)	10 (3.6)	
Yes	66 (56.9)	27 (23.3)	7 (6.0)	16 (13.8)	
Total score HSS scale					<0.001
T1/T2: 30–76	220 (85.9)	15 (5.9)	12 (4.7)	9 (3.5)	
T3: 77–120	79 (61.2)	24 (18.6)	11 (8.5)	15 (11.6)	

Abbreviations: ART, antiretroviral treatment; T1, first tercile; T2, second tercile; T3, third tercile.

discomfort. Additionally, 29.1% of participants showed significant symptoms of anxiety, while 21.0% exhibited signs of depression. The mean score on the HIV Stigma Scale was 68.3 (SD 19.0) (Table 1).

Loneliness and SIL: prevalence and associated factors

The mean (SD) total UCLA-3 score was 3.98 points (1.70), and the median score (IQR) was 3 points [3–5]. In the case of SIL, the participants had a mean (SD) score of 34.3 (10.9) and a median (IQR) score of 36 [27–42] on the Lubben scale.

In particular, the participants had a mean (SD) family subscale score of 18.4 points (6.8) and a median (IQR) score of 20 points (15–23), while the mean (SD) non-family subscale score was 15.9 points (6.6) and the median score (IQR) was 17 points (12–20).

Overall, 77.7% ($n = 310$) of participants reported experiencing neither loneliness nor SIL, while 10.0% ($n = 40$) experienced only loneliness, 5.8% ($n = 23$) experienced only SIL, and 6.5% ($n = 26$) experienced both. Consequently, the overall prevalence of loneliness was 16.5%, and the prevalence of SIL was 12.3%.

The prevalence of significant loneliness and evident SIL based on the characteristics of the people with HIV are shown in Table 2.

Various sociodemographic, clinical and psychological variables were associated with loneliness and SIL in both univariable (Table 3) and multivariable analyses (Table 4). Multivariable analyses revealed that being aged 50–59, unemployed or retired, living alone unwillingly, being single, having a poorer QoL, experiencing clinically significant anxiety and facing HIV-related stigma were associated with a higher risk of loneliness but not SIL. On the other hand, factors associated with SIL only included having primary or lower education, living alone unwillingly and having clinically significant depressive

symptoms. Individuals who lived alone unwillingly, had depressive symptoms and experienced HIV-related stigma were at an increased risk of experiencing both loneliness and SIL.

DISCUSSION

This multicentre study provides novel findings on the prevalence of both loneliness and SIL in Spanish people with HIV. The estimated prevalence rates of significant loneliness and SIL were 16.5% and 12.3%, respectively. Moreover, we identified psychosocial and medical factors associated with loneliness, SIL and both conditions. In our study, participants who lived alone unwillingly were nearly four times more likely to experience loneliness, 18 times more likely to experience SIL, and nearly 25 times more likely to experience both conditions simultaneously. Additionally, being under 60 years of age, having anxiety symptoms, experiencing greater HIV-related stigma, having a poorer QoL, being unemployed or retired, and being single were significant predictors of loneliness. Moreover, participants with significant depressive symptoms and those with a lower level of education were more likely to experience SIL. Finally, participants with both conditions reported higher levels of depressive symptoms and greater HIV-related stigma.

A limited number of studies have investigated the prevalence of loneliness in people with HIV [6, 29–34, 49–54], but fewer have assessed it in people with HIV aged 50 years or older [6, 29–34]. In a cross-sectional study, Greene et al. [29] reported that 58% of patients reported experiencing any loneliness symptoms, with 24% categorized their symptoms as mild, 22% categorized their symptoms as moderate, and 12% categorized their symptoms as severe. Similarly, Light et al. [54] reported that 19.6% of patients frequently experienced feelings of loneliness and lack of companionship, with 13.2% feeling

TABLE 3 Univariable relative risk ratios for loneliness and social isolation, compared with neither loneliness nor social isolation, among the 399 people with HIV included in the study.

	Loneliness only		Social isolation only		Loneliness and social isolation	
	RRR (95% CI)	<i>p</i> -value	RRR (95% CI)	<i>p</i> -value	RRR (95% CI)	<i>p</i> -value
Sociodemographic characteristics						
Gender: female vs. male	2.40 (1.14–5.06)	0.021	1.41 (0.66–3.04)	0.377	1.47 (0.59–3.69)	0.407
Age (years): 50–59 vs. ≥60	1.97 (1.16–3.36)	0.012	0.54 (0.24–1.25)	0.153	0.99 (0.47–2.05)	0.970
Place of birth: non-Spain vs. Spain	0.52 (0.19–1.43)	0.203	1.34 (0.36–4.92)	0.661	1.91 (0.71–5.10)	0.198
Place of residence: rural vs. urban	2.08 (1.09–3.98)	0.027	1.51 (0.50–4.57)	0.469	0.60 (0.14–2.54)	0.484
Educational level: primary or lower vs. secondary or higher	1.05 (0.58–1.90)	0.870	5.58 (2.00–15.53)	0.001	1.57 (0.57–4.31)	0.378
Employment status: unemployed/retired vs. student/active worker	2.17 (1.21–3.86)	0.009	2.32 (0.86–6.29)	0.098	2.44 (0.97–6.09)	0.057
Personal situation: lives alone unwillingly vs. does not live alone/lives alone by choice	4.92 (1.20–20.17)	0.027	13.13 (3.93–43.85)	<0.001	18.60 (5.30–65.33)	<0.001
Marital status						
Single vs. married/in a relationship	2.34 (1.22–4.49)	0.011	1.81 (0.63–5.19)	0.271	4.02 (1.49–10.81)	0.006
Separated/widowed vs. married/in a relationship	3.21 (1.36–7.60)	0.008	1.61 (0.31–8.23)	0.570	1.61 (0.38–6.74)	0.517
Clinical characteristics						
Time since HIV diagnosis (years): ≥15 vs. <15	1.90 (0.96–3.78)	0.065	1.71 (0.68–4.31)	0.252	1.07 (0.44–2.59)	0.878
Mode of HIV acquisition						
Heterosexual vs. MSM	1.37 (0.60–3.11)	0.450	1.64 (0.66–4.12)	0.288	0.75 (0.26–2.16)	0.592
Intravenous drug user vs. MSM	1.71 (0.59–4.99)	0.323	4.00 (1.57–10.20)	0.004	0.73 (0.25–2.12)	0.560
CD4 count (cells/μL): ≥500 vs. <500	1.06 (0.43–2.62)	0.898	0.81 (0.29–2.28)	0.688	0.80 (0.26–2.41)	0.686
HIV RNA <50 copies/mL: no vs. yes	0.78 (0.21–2.91)	0.714	0.92 (0.28–3.04)	0.890	0.80 (0.14–4.62)	0.807
Previous AIDS event: yes vs. no	1.27 (0.68–2.37)	0.444	1.30 (0.48–3.51)	0.603	1.32 (0.65–2.68)	0.438
HBV coinfection (HBsAg+): yes vs. no	1.11 (0.25–4.81)	0.894	0.95 (0.15–6.09)	0.961	0.84 (0.12–5.83)	0.860
HCV coinfection (RNA+)						
Previous (cured) vs. no	1.69 (0.80–3.56)	0.168	2.77 (0.99–7.72)	0.052	1.19 (0.57–2.51)	0.643
Active vs. no	–	–	–	–	2.57 (0.19–34.96)	0.480
ART adherence in the last 4 weeks: ≤95% vs. >95%	3.20 (1.27–8.08)	0.014	–	–	–	–
Number of comorbidities						
1 vs. 0	1.17 (0.33–4.12)	0.808	1.17 (0.28–4.90)	0.831	1.50 (0.55–4.08)	0.423
2 vs. 0	1.67 (0.65–4.29)	0.286	1.75 (0.84–3.65)	0.134	0.67 (0.17–2.64)	0.565
≥3 vs. 0	2.23 (1.21–4.11)	0.010	2.20 (0.81–6.00)	0.124	0.84 (0.25–2.85)	0.776
Polypharmacy: yes vs. no	1.67 (0.81–3.42)	0.163	1.79 (1.08–2.97)	0.025	2.04 (1.01–4.13)	0.048
Tobacco, alcohol, and drug consumption						
Ever a regular tobacco user: yes vs. no	1.21 (0.55–2.67)	0.642	0.92 (0.37–2.29)	0.861	1.41 (0.53–3.73)	0.490
Risky alcohol consumption: yes vs. no	1.57 (0.68–3.62)	0.294	0.70 (0.13–3.63)	0.667	1.57 (0.54–4.51)	0.406
Drug use in the last year: yes vs. no	1.44 (0.67–3.08)	0.351	1.16 (0.34–3.93)	0.815	1.54 (0.64–3.66)	0.333
Quality of life, anxiety, depression and self-reported HIV stigma						
EQ-5D VAS: T1 vs. T2/T3	4.03 (2.15–7.55)	<0.001	1.76 (0.87–3.56)	0.113	5.50 (2.14–14.10)	<0.001

TABLE 3 (Continued)

	Loneliness only		Social isolation only		Loneliness and social isolation	
	RRR (95% CI)	<i>p</i> -value	RRR (95% CI)	<i>p</i> -value	RRR (95% CI)	<i>p</i> -value
Clinically significant depression: yes vs. No	3.45 (1.80–6.61)	<0.001	3.96 (1.92–8.17)	<0.001	13.87 (6.01–32.01)	<0.001
Clinically significant anxiety: yes vs. no	8.28 (3.80–18.04)	<0.001	1.61 (0.74–3.52)	0.231	5.89 (2.63–13.18)	<0.001
Total score HSS scale: T3 vs. T1/T2	4.46 (2.16–9.21)	<0.001	2.55 (0.97–6.74)	0.058	4.64 (1.97–10.95)	<0.001

Abbreviations: ART, antiretroviral treatment; CI, confidence interval; RRR, relative risk ratios; T1, first tercile; T2, second tercile; T3, third tercile.

TABLE 4 Multivariable relative risk ratios for loneliness and social isolation, compared with neither loneliness nor social isolation, among the 399 people with HIV included in the study.

	Loneliness only		Social isolation only		Loneliness and social isolation	
	RRR (95% CI)	<i>p</i> -value	RRR (95% CI)	<i>p</i> -value	RRR (95% CI)	<i>p</i> -value
Sociodemographic characteristics						
Age, years: 50–59 vs. ≥60	2.46 (1.26–4.82)	0.008	0.66 (0.27–1.59)	0.353	0.97 (0.29–3.26)	0.961
Educational level: primary or lower vs. secondary or higher	0.53 (0.21–1.37)	0.191	5.45 (1.99–14.93)	0.001	1.40 (0.44–4.40)	0.568
Employment status: unemployed/retired vs. student/active worker	2.61 (1.21–5.64)	0.009	1.23 (0.37–4.16)	0.735	1.53 (0.35–6.66)	0.570
Personal situation						
Lives alone unwillingly vs. does not live alone/lives alone by choice	3.73 (1.14–12.25)	0.030	18.13 (6.64–49.48)	<0.001	24.66 (7.45–81.60)	<0.001
Marital status						
Single vs. married/in a relationship	2.17 (0.97–4.84)	0.011	1.35 (0.36–5.05)	0.655	2.98 (0.80–11.06)	0.103
Separated/widowed vs. married/in a relationship	1.90 (0.74–4.87)	0.181	0.87 (0.16–4.84)	0.878	0.64 (0.10–4.02)	0.638
Quality of life, anxiety, depression and self-reported HIV stigma						
EQ-5D VAS: T1 vs. T2/T3	2.73 (1.03–7.21)	0.043	0.67 (0.26–1.74)	0.412	1.99 (0.61–6.54)	0.254
Clinically significant depression: yes vs. no	0.81 (0.30–2.14)	0.667	4.16 (1.49–11.61)	0.007	8.61 (3.20–23.18)	<0.001
Clinically significant anxiety: yes vs. no	4.81 (1.85–12.50)	0.001	0.72 (0.30–1.74)	0.461	1.73 (0.64–4.69)	0.280
Total score HSS scale: T3 vs. T1/T2	3.25 (1.32–7.99)	0.010	2.35 (0.80–6.94)	0.122	3.44 (1.16–10.15)	0.025

Note: Bold indicates statistically significant values $p < 0.05$.

Abbreviations: CI, confidence interval; RRR, relative risk ratios; T1, first tercile; T2, second tercile; T3, third tercile.

left out and 17.9% reporting feeling isolated. From another perspective, Yoo-Jeong et al. [32], using the PROMIS-SI scale, reported that 30.7% of respondents experienced loneliness, and Mazonson et al. [33] reported

that the prevalence of loneliness was 53.8% for respondents aged 55–59 years and 46.2% for those aged 60 years and older. Our data are similar to those reported by Greene et al. [29] and Light et al. [54], who employed the

UCLA test to assess loneliness. Thus, the cutoff point employed in our study might correspond to the most severe cases of loneliness identified in those studies. Despite employing the UCLA 3-item scale and the same cutoff used in our study, Mazonson et al. [33] reported higher rates of loneliness. These differences could be due to the sample characteristics of our population, which included more Caucasians (94% vs. 69%), women (33% vs. 11%) and individuals a lower prevalence of alcohol consumption (23.4% vs. 27%) or recreational drug use (20% vs. 30%). On the other hand, the higher rates of loneliness reported by Yoo-Jeong et al. [32] might be due to the use of different assessment instruments (PROMIS-SI scale).

As previously noted, our study identified several variables significantly associated with an increased risk of loneliness. Similar findings have been reported by other authors. So, higher levels of loneliness have been observed in single people, those living alone and those with lower educational levels within the older general population [55, 56]. These associations are also reported among people with HIV, where living alone, not being married and having a lower education level have been linked to increased loneliness [33, 49, 53, 54]. Additionally, a lower health-related QoL has also been associated with loneliness in older people with HIV [29, 33], a finding also observed in our study. In contrast to our findings, a study conducted in Canada identified being female, consuming alcohol and taking non-medical drugs as predictors of loneliness [54]. Furthermore, higher rates of current smoking, at-risk drinking, recreational drug use and depressive symptoms have also been associated with greater loneliness among older people with HIV [33, 57]. Interestingly, we observed a positive association between loneliness and increased levels of HIV-related stigma. This suggest that HIV-related stigma may be a key factor in understanding loneliness among older people with HIV. Studies that have explored the relationship between loneliness and perceived discrimination due to HIV infection or HIV-related stigma consistently report a positive association [8, 22, 23, 32, 52, 58–62]. Other models have suggested a two-way relationship, where HIV-related stigma or discrimination can lead to depression or loneliness, and vice versa [21, 59]. Conversely, other models view both loneliness and depression as outcomes of stigma or discrimination, without establishing clear causal relationships between them [8, 61, 63]. In this scenario, people with HIV who experience higher levels of perceived discrimination or HIV-related stigma would be more susceptible to SIL and subsequently more vulnerable to anxiety or depression [21–23].

The prevalence of SIL in our study was 12.3%. Limited information is available concerning SIL in people

with HIV [6, 18, 19, 64–67]. In the study by Greysen et al. [18], the prevalence of SIL among people with HIV was 59% [18], which is significantly higher than the prevalence observed in our study. Marg et al. [19] reported that 17.7% of respondents experienced feelings of isolation. Comparing our findings with those of the studies previously reported [18, 19] is challenging because their studies did not use the validated LSNS, which was employed in our study. Although this scale has been employed in other HIV cohorts, it has not been specifically applied to older people. In two cross-sectional studies conducted in India, one group reported a 2.9% prevalence of SIL among people with HIV aged 20–60 years [64], while another study reported a 4.1% prevalence of SIL in a cohort of women [66]. Additionally, in Nigeria, 39.1% of respondents were at high risk of SIL [67]. It is important to note that our results are not directly comparable to those of the previously mentioned studies due to differences in socioeconomic and cultural context, as well as variations in the age of the population studied.

Regarding the variables significantly associated with SIL, our findings indicate that living alone unwillingly and having a lower education level are predictive of SIL, consistent with other observations among individuals experiencing loneliness [33, 49, 54]. In addition, we observed a significant association between SIL and depressive symptoms, but no significant association with higher levels of HIV-related stigma. This suggests that some participants could experience SIL independently of HIV-related stigma, which could increase their risk of developing clinically significant depressive symptoms. Moreover, while HIV-related stigma predicts loneliness, it does not necessary predict SIL. Loneliness, being a subjective feeling, differs from SIL, which is an objective condition related to a lack of social networks. Not everyone who experiences loneliness has SIL, underscoring the importance of studying loneliness and SIL separately. Indeed, contrary to what might be expected, the coexistence of loneliness and SIL does not identify new risk factors, though it does exacerbate the overall risk.

Interestingly, in our study, none of the variables related to HIV, comorbidities or substance use influenced either loneliness or SIL. In the context of HIV infection, specifically regarding ART adherence, our study did not reveal any differences. Similarly, other authors have not demonstrated variations in HIV infection parameters, including CD4 T-cell count, HIV viral load, AIDS status or the number of years living with HIV [57, 68]. Conversely, some authors have reported that lonely participants who acquired HIV through other or unknown risk factors [49] had a lower CD4 count [32], a higher

nadir CD4 count [69], or lower adherence to ART [54]. The Women's Interagency HIV Study [8] revealed that depressive symptoms, feelings of loneliness and low perceived social support played mediating roles in the relationship between internalized stigma and suboptimal adherence to ART. Compared with non-lonely participants, lonely participants were significantly more likely to have a lower CD4 count [32].

This study has the inherent limitations. First, the cross-sectional design prevents the establishment of causality between exposure variables and outcomes related to loneliness and SIL. However, these designs allow for the identification of significant patterns and associations within the population of people with HIV, offering valuable insights for future research and potential interventions. Second, while the generalizability of our findings may be limited, the study sample is representative of older people with HIV in Spain. Third, anxiety and depression were assessed using the HADS scale, which, although not validated against the gold standard – a semi-structured interview with a mental health professional – is a well-established tool in HIV research. In Spain, the HADS has demonstrated a strong correlation with the gold standard for screening in this population. Finally, although the exclusion of participants with a life expectancy of less than 1 year could introduce bias by omitting relevant cases, it is justified by the study's aim to focus on individuals who are more likely to benefit from interventions and improvements in their QoL. This approach seeks to provide more relevant and actionable information for the broader population of people with HIV. On the other hand, a notable strength of this study is its multi-centre analysis of a well-controlled population of individuals over 50 years old from an immunovirological perspective, providing a comprehensive evaluation of both loneliness and SIL.

Given the substantial negative impact of loneliness and SIL among people with HIV [13–18] and the complexity of these issues, further studies are necessary. Such studies should focus on enhancing our understanding and developing effective preventive strategies. Addressing both loneliness and SIL is crucial not only for improving the overall well-being of people with HIV but also for developing specific interventions to mitigate these challenges in this population.

Finally, the social and civic consequences of loneliness and SIL, which have been largely overlooked, may be contributing factors to the erosion of social cohesion. This is particularly concerning for people with HIV, an already vulnerable population. Therefore, addressing loneliness and SIL as a public health issue is crucial to fostering a more cohesive and trusting society.

AUTHOR CONTRIBUTIONS

Design of the Project: J-RB, AG-B, JDLT and JO. Statistical analysis: IJ. Interpretation of results, and drafting of the manuscript: J-RB, AG-B, JDLT, JO and IJ. Patient recruitment and review of the second draft: all authors. Approval of the final version of the document: all authors.

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CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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APPENDIX A

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