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HIV, Social Networks, and Loneliness among Older Adults in Uganda

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Declarations

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Abstract

Loneliness among older adults has been identified as a major public health problem. Yet little is known about loneliness, or the potential role of social networks in explaining loneliness, among older people with HIV (PWH) in sub-Saharan Africa, where 70% of PWH reside. To explore this issue, we analyzed data from 599 participants enrolled in the Quality of Life and Ageing with HIV in Rural Uganda study, including older adults with HIV in ambulatory care and a comparator group of people without HIV of similar age and gender. The 3-item UCLA Loneliness Scale was used to measure loneliness, and HIV status was the primary explanatory variable. The study found no statistically significant correlation between loneliness and HIV status. However, individuals with HIV had smaller households, less physical and financial support, and were less socially integrated compared to those without HIV. In multivariable logistic regressions, loneliness was more likely among individuals who lived alone (aOR:3.38, 95% CI:1.47–7.76) and less likely among those who were married (aOR:0.34, 95% CI:0.22–0.53) and had a higher level of social integration (aOR:0.86, 95% CI: 0.79–0.92). Despite having smaller social networks and less support, older adults with HIV had similar levels of loneliness as those without HIV, which may be attributed to resiliency and access to HIV-related health services among individuals with HIV. Nonetheless, further research is necessary to better understand the mechanisms involved.

Keywords

HIV; Social Networks; Social Integration; Loneliness; Older Adults; Uganda

Introduction

The average age of the population of people with HIV (PWH) is increasing, especially in sub-Saharan Africa. In 2020, approximately 70% of the 37 million people with HIV (PWH) worldwide lived in sub-Saharan Africa, and more than 50% were over 50 years of age [1]. Loneliness is prevalent among older people, particularly among older PWH in high-income settings [2], and is associated with poor control of chronic medical conditions, depression, and adverse health outcomes, including death. The magnitude of these associations is greater among older adults [3–5]. The experience of loneliness has been conceptualized as the feeling of distress that accompanies a perceived unmet need for relationships, either in quantity or in quality [6]. Much of the literature on loneliness and health among older people has been derived from high-income countries, where feelings of loneliness are endorsed by

approximately one-third of older adults [7], and nearly half of older PWH [2, 8]. Much less is known about loneliness in older PWH in sub-Saharan Africa.

The scarcity of data about the prevalence of loneliness among older people in sub-Saharan Africa highlights a significant research gap. Given that loneliness is a globally significant public health issue for older adults, it is essential to delve into this topic within specific contexts. The surge in urbanization, particularly in sub-Saharan Africa [9], coupled with changing family structures [10–12], may compromise social support systems, suggesting that loneliness might be a pressing concern for older individuals in this region [11, 12]. On the other hand, the persistence of multigenerational families [10], which have traditionally served as sources of intergenerational support [10], could potentially alleviate loneliness. Furthermore, collectivist cultures characterized by values such as obligation, cohesion, and commitment might serve a protective function against loneliness [13]. Studies of older PWH in rural South Africa and Uganda have also shown that having a stronger, more extensive, and primarily family-based social network is associated with greater interaction with social network members and greater community interdependence [14]. Other studies have shown that PWH tend to exhibit resilience as a consequence of managing multiple chronic health conditions [15–17] and achieving mastery [18, 19]. Studies from South Africa have shown that older PWH have access to healthcare support (e.g., through clinics funded by the U.S. President's Emergency Plan for AIDS Relief) that may not be available to HIV-negative older people [20, 21]. And finally, older PWH contend with unique challenges, including stigma, discrimination, smaller social networks, and social isolation [22]. These patterns underscore the need to comprehensively understand the factors that contribute to loneliness among older PWH.

The present study is motivated by Social Provisions Theory [23–30]. Through an examination of factors such as social networks, social integration, various types and sources of social support, and their differentiation between older adults living with and without HIV, this framework can help to understand the determinants of loneliness that can help trace their origins to family, friends, mentors/providers, or one's own sense of self [23–27]. We hypothesize that these constructs are crucial for flourishing among older adults with chronic health conditions, including HIV, because they can help older adults adhere to treatment, maintain healthy lifestyles, cope with daily challenges, and alleviate loneliness [19, 31].

To address the gaps in the literature reviewed above, we conducted a cross-sectional analysis of baseline data from older people enrolled in an ongoing cohort study in rural Uganda. The primary objective of the present analysis was to estimate the association between HIV serostatus and loneliness. We also sought to compare the two groups in terms of social networks, social support, and social integration, in order to investigate how they affect loneliness in this setting.

Methods

Study Population and Data Collection

We analyzed data from 599 participants enrolled in the *Quality of Life and Ageing with HIV in Rural Uganda Study*, a study of quality of life among older PWH in a rural region

of southwestern Uganda [32]. PWH were eligible to participate if they were older than 49 years of age and had been on ART for at least three years and were engaged in ambulatory HIV care at the Mbarara Regional HIV Clinic or the Kabwohe Clinical Research Center HIV Clinic (n = 297). We then recruited an age- and sex-similar group of people without HIV (PWOH) from census data located in the same clinic catchment areas [33]. Data were collected during October 2020-October 2021. Due to the COVID-19 epidemic, data were collected via phone interview during this wave of the study.

Measures

Our primary explanatory variable of interest was HIV serostatus, which was based on confirmatory HIV testing [34]. The primary outcome was the 3-item UCLA Loneliness Scale [35], which queries participants about whether they "never," "sometimes," or "often" feel a lack of companionship, feel left out of community meetings or events, or feel isolated from others. We assigned one point to "never" responses, two points to "sometimes," and three points to "often" responses, allowing for a total loneliness score ranging from 3 to 9, with higher scores indicating a higher degree of loneliness. We followed Steptoe et al. [36] in defining loneliness at the fifth quintile of the distribution of the total loneliness score (≥5 in this study sample). The UCLA Loneliness Scale has been used in many African settings, including Uganda, South Africa and Zimbabwe and Ghana, and has shown consistent and reliable measurement properties across many countries [37].

To better understand similarities or differences in loneliness between PWH vs. PWOH, we compared the two groups on several measures of social connection factors based on Social Provisions Theory [25, 28–30], including social networks, social support and social integration:

- We measured three structural aspects of social networks by eliciting the number of people living in the respondent's household, marital status (married or cohabitating with a partner vs. divorced/separated, widowed, or single), and whether the study participant reported living alone.
- We measured physical social support [38] by characterizing the *types* of physical support they received from others (e.g., buying food, agricultural work, fetching water, cooking, going to the clinic or traditional healer, and collecting firewood; maximum of 6 types) and the *sources* of familial physical support (spouse, parent, son/daughter, grandson, granddaughter, son/daughter-in-law, and other relatives; maximum of 4 sources). We also elicited whether they received physical support from any community source (community members, neighbors, church attendees, or paid helpers).
- Similar to the above, we measured financial social support [38] by characterizing the *types* of financial support (e.g., paying for medicines, doctor visits, clinical or hospital fees, food, clothing, transportation, school expenses for offspring; maximum of 6 types), the s*ources* of familial financial support (maximum of 3 sources as above), and receipt of any financial support from any community source.

- We measured social integration by assessing the total number of social groups in which each respondent participated. We took a comprehensive census of all community groups in the area and categorized them as follows [39]: vocational groups; positive living groups for PWH; local council committees; water committees; village health teams; National Agriculture Advisory Services groups; church or other religious groups; women's groups; gardening committees; community burial groups; clan groups; and revolving funds, savings and credit co-operative society (SACCO) groups, registered savings groups, or other community or village savings groups. The total social integration score was the total number of groups in which the respondent reported participation (out of a maximum of 20).

Additional covariates included age; sex; educational attainment; self-reported alcohol consumption (never vs. any); and the number of self-reported comorbidities, including diabetes, high blood pressure, heart attack or heart failure, kidney problems, stroke, cancer, chronic obstructive pulmonary diseases, asthma, pneumonia, high cholesterol, and tuberculosis.

Statistical Analysis

We compared PWH vs. PWOH on the loneliness and social connection variables, using Student's t-tests, log-rank tests, and chi-squared tests as appropriate. To estimate the association between HIV status and loneliness, we fitted a multi-variable logistic regression model with loneliness specified as the outcome and HIV as the primary explanatory variable, while adjusting for the covariates listed above. As described in more detail below, we unexpectedly observed statistically significant differences between PWH and PWOH on several of the social connection variables but no statistically significant difference on the primary outcome. We therefore estimated a series of multivariable logistic regression models specifying loneliness as the outcome and the social connection variables as the explanatory variables, with each regression model including one of the social connection variables and adjusting for the covariates listed above (10 regression models in total). To assess the robustness of our findings to misclassification resulting from the potentially arbitrary cut-off threshold in the outcome, we also fit a series of negative binomial regressions specifying the total loneliness score (ranging from 3 to 9) as a count outcome variable. Statistical significance was designated at the conventional 0.05 level. All analyses were conducted with SAS version 9.4 [40].

Ethical Considerations

The study was approved by the ethics committees at Mass General Brigham in the United States and at the Mbarara University of Science and Technology in Uganda. We also obtained clearance to conduct the study from the Uganda National Council of Science and Technology. All participants consented to participate in the study verbally. The review committees waived written consent due to the COVID-19 pandemic and the infeasibility of obtaining written consent during remote data collection.

Results

The study sample included 297 PWH and 302 PWOH (Table 1). The mean age of participants was 58 years (range, 49–88 years). By design, women accounted for 49% of the study population (295/599). Most study participants had achieved a primary school level of education or less (74%, 442/599). The mean number of comorbidities was 0.5 (standard deviation [SD] 0.8; range, 0–5). PWH were less likely to be married or report alcohol use, but otherwise there were no statistically significant differences in age, sex, education, or comorbidities between PWH and PWOH.

PWH had smaller household sizes (3.5 [SD, 2.2] vs. 3.9 [SD, 2.1], Z=−2.7, $P = 0.01$) and were more likely to live alone (7.1% [21/297] vs. 1.3% [4/302], Fisher's exact test $P < 0.001$). PWH had lower social integration scores (2.8 [SD, 3.1] vs. 3.8 [SD, 3.3], Z=−4.1, $P < 0.001$) (Fig. 1A), received fewer types of physical support (2.3 [SD, 1.9] vs. 3.3 [SD, 1.8], Z=−6.4, $P < 0.001$) (Fig. 1B) and fewer sources of physical support (1.1 [SD, 1.2] vs. 1.6 [SD, 1.1], Z=−2.8, $P < 0.001$) (Fig. 1C). They also had fewer types of financial support (0.9 [SD, 1.8] vs. 1.3 [SD, 2.0], Z=−5.0, $P < 0.001$) (Fig. 1D), and fewer sources of financial support (0.3 [SD, 0.6] vs. 0.4 [SD, 0.6], Z=−2.9, $P < 0.001$) (Fig. 1E). We found no statistically significant differences in the receipt of community physical support and community financial support.

A substantial proportion of study participants reported feeling lonely: 179 (29.8%) felt they "sometimes"/"often" lacked companionship, 158 (26.3%) felt left out of community meetings, and 118 (19.7%) felt isolated from others. Altogether 156 (26.0%) met the threshold definition of loneliness, with a score of 5 or greater on the loneliness scale. A higher proportion of PWH (vs. PWOH) met the threshold definition of loneliness, but in contradiction of our hypothesis based on existing literature, the comparison with PWOH did not reveal statistically significant differences in loneliness by HIV serostatus (28.3% vs. 23.8%, chi-square = 5.4, $P = 0.22$). This finding persisted after multivariable adjustment (adjusted odds ratio [aOR]: 1.24, 95% CI: 0.86–1.80, Table 2). In a series of multivariable logistic regression models in which we specified the social connection variables as the primary explanatory variables of interest while adjusting for sociodemographic covariates (10 regression models in all), loneliness was inversely associated with living with a spouse/partner (aOR: 0.34, 95% CI: 0.22–0.53) and with greater social integration (aOR: 0.86 per community group, 95% CI: 0.81–0.91), but positively associated with living alone (aOR: 3.38, 95% CI: 1.47–1.86). Loneliness did not have a statistically significant association with any of the physical or financial support variables (Table 2).

The results from negative binomial regressions, in which the total loneliness score was specified as a count variable, indicated similar findings for the association between HIV and loneliness, and between several of the social connection variables and loneliness (Table 3).

Discussion

In a cross-sectional study of 599 older PWH in rural Uganda, and an age- and sex-similar sample of PWOH, we found no statistically significant difference in loneliness between

the two groups. This finding differs from similar studies in high-income settings, where PWH generally report a higher prevalence of loneliness than PWOH [2]. Our finding was unexpected, particularly given that we did find that PWH generally had a restricted range of social connections: they were more likely to live alone, were less likely to live with a spouse or primary partner, had smaller household sizes, reported fewer types and sources of support, and were less socially integrated. In this regard, our findings are consistent with prior work [41]. Considered in light of other recent findings from this same cohort showing that PWH had higher health-related quality of life compared with PWOH [32, 42], these findings suggest a certain degree of resilience among PWH despite structural disadvantages in the nature and breadth of their social connections [43–46]. This assumption is supported by a previous study's finding of multiple resilience resources among PWH that helps them manage their health conditions and improve their well-being in order to survive and flourish [43–45, 47]. Furthermore, social support accessed through clinic-based medical care, such as antiretroviral therapy programs and peer support groups, could also play a role in enhanced resilience and better coping among PWH, helping them to reduce the impacts of stigma and discrimination and, thus, reduce loneliness among older PWH [43–45, 48]. Consistent with this idea, other studies of PWH in rural Uganda have shown that both depression and internalized stigma decline over time on antiretroviral therapy [37, 49, 50]. Future research should further investigate the impact of formal health services on various forms of resilience and explore the differences in traditional social cohesion across generations [51] and the effect of reduced cohabitation on access to and receipt of care and support, particularly as PWH grow into older age [52].

Notwithstanding the relatively smaller social networks among PWH, most study participants in our study in Uganda lived with extended family, and less than 10% lived alone. This finding is consistent with previous studies conducted in Uganda and other countries throughout sub-Saharan Africa, which have demonstrated how family structures can serve as a *de facto* social security system and compensate for the often limited formal services available for aging populations [47, 51, 53]. These social arrangements contrast starkly with data from resource-rich settings. However, a previous household survey in Uganda found that older people living alone lacked family support networks and formal community care centers [51]. Because traditional social cohesion is changing across generations as a result of immigration and economic development, there is a need to strengthen the social support system for older adults in their later years, especially older PWH living alone [51, 54]. The more expansive social networks, stronger kinship ties, and greater community interdependence in rural areas of Africa likely have an impact on the needs of PWH as they age, with concomitant implications for the support services needed for this population.

Two additional findings from our study are worthy of note. First, we found that greater social integration is inversely associated with loneliness. This finding, which is consistent with reporting from high-income countries [55], may strengthen the case for the benefit of involvement in social activities, which increases social capital, positive health outcomes, and overall well-being in older adults in the region as well [56]. In addition, a previous study showed that social integration is associated with a sense of belonging because it allows older adults to engage with and expand their social networks and to feel more loved [57]. Interventions to strengthen the social integration of older-age people in rural Uganda may

reduce loneliness among both PWH and PWOH. Second, we found that loneliness was more prevalent among women. Prior studies on sex differences in loneliness have yielded mixed findings. Two studies of older adults in the global north similarly showed that loneliness was more prevalent among women [58–60], potentially due to longer life expectancies and therefore greater risks for widowhood, living alone, chronic illness, disability, and functional limitations, all of which are likely associated with higher risk of depression in women in high income settings [59, 61]. In contrast, a study of community-dwelling older-age Mozambican migrants in South Africa found that loneliness was more prevalent among men, due to their lower rates of social support, social participation and smaller social networks [62]. Future studies may identify specific psychosocial mechanisms to explain these gender differences in loneliness.

Interpretation of our findings is subject to certain limitations. The primary limitation of this study is the cross-sectional study design and our inability to infer the causal relationship between social network variables and loneliness. Second, our data were collected in a rural region of southwestern Uganda and may not generalize to other settings and other populations. Third, although loneliness is reliably measured across many countries, there is insufficient information on the topic in sub-Saharan Africa, especially in Uganda [63]. Fourth, the measurements of social connections used in this study focused on structural aspects of social connections and did not assess aspects of tie strength, including frequency of contact, reciprocity, and intimacy [64]. As such, additional data are required to provide information about the quality and density of social support to understand the extent to which these may help prevent loneliness among PWH.

Conclusions

This analysis of cross-sectional data on older PWH and PWOH in rural Uganda identified no statistically significant differences in loneliness, even though PWH had smaller social networks and less financial and physical support. We hypothesize that the quality of social support networks, formal health services, and multiple sources of resilience resources may explain these findings, but further research is needed to better understand the mechanisms underlying the observed differences. While more research is needed to better understand these findings, resolution of this paradox may help to identify interventions for improving the health and mental health of older PWH in rural Uganda.

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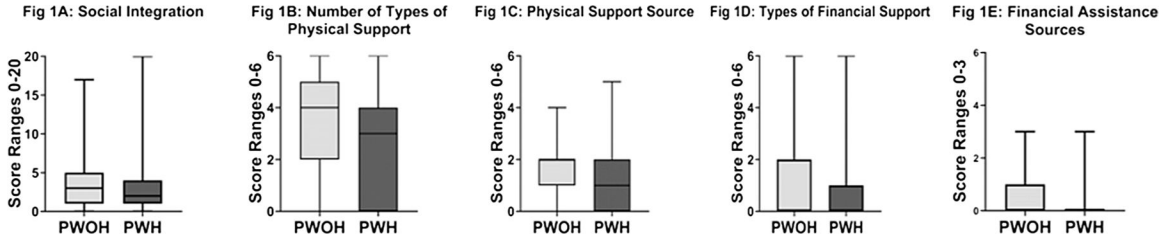

Fig. 1.

Comparison of social integration, physical, and financial support among people with HIV (PWH) vs. people without HIV

Table 1

Characteristics of the sample, stratified by HIV Status

Characteristics	Total (*N* = 599)	HIV-negative (*N* = 302)	HIV-positive (*N* = 297)	Statistic's Values	Z, chi-square, or Fisher
Age (years), mean [standard deviation (SD)]	58.4 (6.6)	58.47 (6.8)	58.34(6.4)	−0.02	*a*
Women, N (%)	295 (49.2)	148 (49.0)	147 (49.5)	0.01	*∞*
Educational attainment, N (%)					
Primary or less (no school or P1-P7)	442 (73.8)	226 (74.8)	216 (72.7)	0.45	*∞*
Secondary (S1-S6)	95 (15.9)	47 (15.6)	48 (16.2)		
Post-secondary	62 (10.4)	29 (9.6)	33 (11.1)		
Alcohol consumption, N (%)	143 (23.7)	82 (27.2)	60 (20.2)	3.40	*∞*
Total comorbidities, mean (SD)	0.5 (0.8)	0.5 (0.8)	0.5 (0.8)	0.13	*a*
Household composition					
Son, N (%)	287 (47.9)	151 (50.0)	136 (45.8)	1.06	*∞*
Daughter, N (%)	279 (46.6)	149 (49.3)	130 (43.8)	1.86	*∞*
Non-biological dependent child, N (%)	14 (2.3)	6 (2)	8 (2.7)	0.33	*∞*
Grandson, N (%)	184 (30.7)	97 (32.1)	87 (29.3)	0.56	*∞*
Granddaughter, N (%)	162 (27)	88 (29.1)	74 (24.9)	1.35	*∞*
Paid helper, N (%)	47 (7.8)	21 (7.0)	26 (8.8)	0.67	*∞*
Parent, N (%)	24 (4)	13 (4.3)	11 (3.7)	0.14	*∞*
Nephew, N (%)	17 (2.8)	7 (2.3)	10 (3.4)	0.60	*∞*
Niece, N (%)	13 (2.2)	7 (2.3)	6 (2.0)	0.06	*∞*
Other family members or relatives$^{\mu}$, N (%)	51(8.5)	22 (7.3)	29 (9.8)	1.18	*∞*
Social networks					
Living with spouse/partner, N (%)	404 (67.4)	242 (80.1)	162 (54.5)	44.65 ***	*∞*
Household size, mean (SD)	3.7 (2.2)	3.91 (2.1)	3.46 (2.2)	−2.70 **	*a*
Living alone	25 (4.2)	4 (1.3)	21 (7.1)	0.0004 ***	*Ω*
Types of physical support, mean (SD)	2.8 (1.9)	3.3(1.8)	2.3 (1.9)	−6.39 ***	*a*
Number of familial sources of physical support, mean (SD)	1.3 (1.1)	1.6 (1.1)	1.1 (1.2)	−2.80 ***	*a*
Any community source of physical support, N (%)	81 (13.5)	36 (11.9)	45 (15.2)	1.33	*∞*
Types of financial support, mean (SD)	1.1 (1.9)	1.3 (2.0)	0.9 (1.8)	−5.01 **	*∞*

Characteristics	Total (*N* = 599)	HIV-negative (*N* = 302)	HIV-positive (*N* = 297)	Statistic's Values	Z, chi-square, or Fisher
Number of familial sources of financial support, mean (SD)	0.3 (0.6)	0.4 (0.6)	0.3 (0.6)	−2.93 **	∞
Any community source of financial support, N (%)	8.0 (1.3)	4.0 (1.3)	4.0 (1.4)	0.27	Ω
Social integration score, mean (SD)	3.3 (3.2)	3.77 (3.3)	2.8 (3.1)	−4.09 ***	∞
Total loneliness score, mean (SD)	3.9 (1.4)	3.83 (1.3)	4.03 (1.4)	2.15 *	∞
Classified as "lonely", N (%)	156 (26.0)	72 (23.8)	84 (28.3)	5.40	∞

Notes:

μ Other family members and other relatives such as brother, sister, sister-in-law, parent-in-law, son-in-law, brother-in-law, daughter-in-law, and other relatives

a Z score of the Wilcoxon Two-Sample Test for continuous or count variables

∞ Chi-square test for binary or categorical variables

Ω Fisher's exact test

* $p \leq 0.05$

** $p < 0.01$

*** $p < 0.001$;

Table 2

Correlates of loneliness, specified as a binary dependent variable

Exposures	Unadjusted[√]	Adjusted
	OR (95% CI)	A OR (95% CI)
HIV-positive	1.26 (0.87, 1.82)	1.27 (0.88, 1.86)
Lives alone	3.27 (1.46, 7.32)	3.38 (1.47, 7.76)
Married	0.29 (0.2, 0.42)	0.34 (0.22, 0.53)
Household size	0.95 (0.88, 1.04)	0.96 (0.88, 1.05)
Types of physical support	0.97 (0.88, 1.07)	1.003 (0.91, 1.11)
Familial sources of physical support	0.87 (0.74, 1.03)	0.92 (0.77, 1.09)
Any community source of physical support	0.66 (0.37, 1.19)	0.61 (0.33, 1.12)
Types of financial support	1.04 (0.95, 1.15)	0.98 (0.89, 1.08)
Familial sources of financial support	1.12 (0.83, 1.52)	0.92 (0.67, 1.27)
Any community source of financial support	1.72 (0.41, 7.28)	1.26 (0.29, 5.51)
Social integration	0.86 (0.8, 0.93)	0.85 (0.79, 0.92)

Notes:

[√]Each cell represents the output of a single regression model with loneliness specified as the outcome and the row variable specified as the primary explanatory variable of interest. Thus, the estimates in column 1 are derived from 11 univariable logistic regression models. The estimates in column 3 are derived from 11 multivariable logistic regressions that also include covariate adjustment for age, sex, education, alcohol consumption, and comorbidities

OR: Odds Ratio

CI: Confidence Interval

Table 3

Correlates of loneliness, specified as a count variable

Exposures	Unadjusted[√] IRR (95% CI)	Adjusted IRR (95% CI)
HIV-positive	1.05 (0.97, 1.14)	1.05 (0.97, 1.14)
Lives alone	1.22 (1.02, 1.47)	1.21 (1.01, 1.46)
Married	0.80 (0.74, 0.87)	0.82 (0.74, 0.91)
Household size	0.99 (0.97, 1.00)	0.99 (0.97, 1.01)
Types of physical support	0.99 (0.97, 1.02)	0.9995 (0.98, 1.02)
Familial sources of physical support	0.98 (0.94, 1.01)	0.98 (0.95, 1.02)
Any community source of physical support	0.95 (0.84, 1.07)	0.93 (0.83, 1.06)
Types of financial support	1.00 (0.98, 1.03)	0.99 (0.97, 1.01)
Familial sources of financial support	1.00 (0.94, 1.08)	0.97 (0.90, 1.04)
Any community source of financial support	1.05 (0.74, 1.48)	0.997 (0.71, 1.41)
Social integration	0.98 (0.96, 0.99)	0.97 (0.96, 0.99)

Notes:

[√]Each cell represents the output of a single regression model with loneliness specified as the outcome and the row variable specified as the primary explanatory variable of interest. Thus, the estimates in column 1 are derived from 11 univariable negative binomial regression models. The estimates in column 3 are derived from a single multivariable negative binomial regression model that also includes covariate adjustment for age, sex, education, alcohol consumption, and comorbidities

IRR: Incidence Rate Ratio

CI: Confidence Interval