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Social Determinants of Loneliness in Brazilian Men Who Have Sex with Men

Felipe Alckmin-Carvalho [1,2], Iara Teixeira [1,3,*], Constança Proença [1], Nayara Martins [1], Guilherme Wendt [4], Martim Santos [1] and Henrique Pereira [1,2,5]

[1] Department of Psychology and Education, Faculty of Social and Human Sciences, University of Beira Interior, 6200-209 Covilhã, Portugal; felipe.carvalho@ubi.pt (F.A.-C.); constanca.proenca.poco@ubi.pt (C.P.); nayara.martins@ubi.pt (N.M.); martimsantos@email.com (M.S.); hpereira@ubi.pt (H.P.)
[2] Research Center in Sports Sciences, Health Sciences and Human Development (CIDESD), 5001-801 Vila Real, Portugal
[3] Intersectionality Lab—European Research Center, 661 43 Säffle, Sweden
[4] Department of Medical Sciences, Western Paraná State University, Francisco Beltrão 85605-010, PR, Brazil; guilherme.wendt@unioeste.br
[5] RISE-Health, Department of Psychology and Education, Faculty of Social and Human Sciences, University of Beira Interior, 6200-209 Covilhã, Portugal
* Correspondence: iara.teixeira@ubi.pt

Abstract

Loneliness has emerged as a significant public health concern among vulnerable populations, particularly gay, bisexual, and other men who have sex with men (MSM), and is shaped by sociodemographic and sociocultural factors. This observational, cross-sectional study aimed to estimate the prevalence of loneliness and examine its associations with sociodemographic and sociocultural factors among Brazilian MSM. A total of 1196 participants (mean age = 39.96 years, *SD* = 12.41) completed measures of loneliness (UCLA Loneliness Scale), sociodemographic characteristics, economic vulnerability, social and community capital, religiosity, and clinical–behavioral factors. More than half of the participants (52.7%) reported moderate or high levels of loneliness. A hierarchical multiple linear regression model was estimated and explained 23% of the variance in loneliness. Greater economic vulnerability and problematic substance use were linked to higher loneliness, whereas being in a romantic relationship, reporting a stronger sense of community belonging, and having social networks composed predominantly of LGBTQIA+ peers were linked to lower loneliness. The absence of formal religion was independently linked to higher loneliness, and HIV serostatus was not significantly related to loneliness after adjustment. These findings highlight the relevance of loneliness in this population and inform interventions targeting material vulnerability and community-based social support.

Keywords: loneliness; LGBTQIA+; men who have sex with men; sexual minorities; social determinants; social support; mental health

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1. Introduction

Loneliness is increasingly recognized as a major public health concern with wide-ranging implications for mental health, physical health, social functioning, and quality of life. Recent international research has emphasized that social connection should be understood as a core social determinant of health rather than a peripheral aspect of well-being (Beller 2024; Holt-Lunstad 2022; World Health Organization 2025). From this perspective,

loneliness is not merely an individual emotional state, but a socially structured phenomenon shaped by broader economic, relational, and contextual conditions.

Conceptually, loneliness is a multidimensional construct. Weiss (1973) introduced a foundational distinction between emotional loneliness, which arises from the absence of a close attachment figure, and social loneliness, which arises from the absence of an engaging social network. Subsequent scholarship further differentiated objective social isolation, defined by the structural features of one's social network, from the subjective experience of loneliness, defined as the perceived discrepancy between desired and actual relational closeness regardless of actual contact frequency (Hawkley and Cacioppo 2010). Beyond its character as a social determinant of health, loneliness is therefore also a psychological determinant, capturing the felt sense of disconnection. The UCLA Loneliness Scale, Version 3 (UCLA-LS v3), used in the present study, primarily captures this subjective psychological dimension rather than objective social isolation, a distinction that is preserved throughout the manuscript.

A growing body of evidence indicates that loneliness is unequally distributed across populations and is strongly influenced by structural factors. Income, occupation, and access to community resources have been identified as key determinants of opportunities for social participation and support, highlighting the role of social inequality in shaping loneliness risk (Beller 2024; Graham et al. 2024; World Health Organization 2025). Moreover, methodological considerations, including sampling and analytic strategies, are critical for accurately estimating mental health and well-being disparities among sexual minority populations (Dharma et al. 2024).

Among sexual minority populations, loneliness appears consistently elevated compared with heterosexual populations. A comparative meta-analysis found that sexual minority individuals report higher levels of loneliness, with disparities linked to minority stress processes, depressive symptoms, and reduced access to safe social environments (Gorczynski and Fasoli 2022; Herrmann et al. 2023; Wright et al. 2024; Xie et al. 2024). For gay, bisexual, and other men who have sex with men (MSM), loneliness reflects not only the absence of social contact but also the impact of stigma, expectations of rejection, relational insecurity, and challenges in identity affirmation. A recent systematic review further demonstrated that both external factors (e.g., exclusion and limited support networks) and internal processes (e.g., negative self-perceptions and concealment) contribute to the development and maintenance of loneliness (Brumfield and Dahlenburg 2025).

These findings are consistent with Sexual Minority Stress Theory (Meyer 1995, 2003) and broader socioecological approaches to sexual stigma, which conceptualize health disparities as the result of processes operating across multiple levels—structural, contextual, interpersonal, and intrapsychic (van der Star 2024). Originally formulated to explain mental health inequities among sexual minorities, Minority Stress Theory posits that chronic exposure to stigma-related stressors, including discrimination, expectations of rejection, concealment of sexual identity, and internalized homonegativity, may erode social connectedness and contribute to psychosocial vulnerability over time (Meyer 1995). Within this framework, loneliness can be understood as a socially patterned outcome of persistent stigma exposure and relational marginalization rather than an individual trait. Discrimination, social inhibition, and social anxiety have been associated with both social and emotional loneliness, whereas community involvement may buffer these effects (Elmer et al. 2022, 2025). In this line, loneliness may serve as a proximal psychosocial pathway linking minority stress experiences to mental health and behavioral outcomes. Internalized homonegativity has been associated with psychological distress partly through loneliness, and these effects may be shaped by culturally embedded norms related to family, affective expectations, and relationship quality (Lin et al. 2025; Liu and Ren 2024; Ross et al. 2024;

Trombetta et al. 2025). Accordingly, associations between stigma-related experiences and behaviors such as chemsex should be interpreted in relation to loneliness as a proximal experience of social disconnection, rather than as inherent to sexual minority status itself. This perspective emphasizes loneliness as a lived experience shaped by stigma-related isolation and unmet relational needs. Conversely, supportive environments, such as mentoring relationships, affirming school spaces, and opportunities for online identity exploration, may strengthen social connection and reduce isolation (Charmaraman et al. 2024; Huang et al. 2024).

Social and community networks play a central role in shaping loneliness among LGBTQIA+ populations. Prior research suggests that these populations differ from cisgender heterosexual groups not only in network composition but also in the quality and meaning of social ties, underscoring the importance of belonging and identity-affirming relationships (De Jesus et al. 2024; Oeser et al. 2025; Polonijo et al. 2024; Scofield et al. 2024). These dynamics are particularly relevant in Brazil, where LGBTQIA+ individuals continue to experience discrimination and unequal access to safety and social recognition. Recent Brazilian evidence indicates that gay, bisexual, and other MSM, as well as transgender and nonbinary individuals, frequently report discriminatory experiences that may hinder the development of stable and affirming relationships (Freitas et al. 2024). In parallel, Brazilian national studies have documented complex associations between religiosity, internalized homonegativity, and depressive symptoms among gay men (Alckmin-Carvalho et al. 2024; Batista et al. 2024). Overall, these studies highlight the importance of social context and interpersonal environments in shaping belonging and, consequently, loneliness among LGBTQIA+ populations.

LGBTQIA+ experiences are further shaped by intersecting identity dimensions, including religious affiliation, race, and ethnicity, which may function both as sources of marginalization and as potential resources for belonging and resilience. Recent work has emphasized that religious contexts are not uniformly exclusionary for LGBTQIA+ individuals. For example, affirming religious spaces, including LGBTQIA+-inclusive congregations, may provide meaningful frameworks of recognition, emotional support, and community belonging, thereby mitigating experiences of social isolation (Ben-Lulu 2024). In this line, religiosity can operate as a dual-context factor, simultaneously capable of producing stigma in some settings while offering protective relational structures in others, particularly within specific affirming religious communities. Similarly, race and ethnicity intersect with sexual minority status in shaping differentiated experiences of exclusion and community formation. In the Brazilian context, scholarship has highlighted how Black LGBTQIA+ individuals may develop distinct forms of social organization and identity negotiation in response to both racialized and sexualized marginalization, often forming community-based networks that function as spaces of resistance, identity affirmation, and collective support within Afro-LGBTQIA+ communities (Ratts 2007). These intersectional dynamics reinforce the idea that loneliness among LGBTQIA+ populations cannot be fully understood without considering how multiple identity axes interact to structure access to social connection, belonging, and institutional recognition.

In fact, LGBTQIA+ experiences in Brazil must be understood within a historically layered context in which legal, cultural, and social dynamics do not evolve in a linear or fully convergent manner. As documented in the Brazilian literature on sexuality and gender, same-sex desire and same-sex relationships have long been negotiated within shifting regimes of visibility, morality, and social regulation, rather than within a straightforward trajectory of inclusion or exclusion (Green 1999; Parker 2014). Although contemporary legal and institutional developments in Brazil have expanded formal rights related to same-sex unions and gender recognition—including, since 2011, the recognition of same-sex

civil unions and equal marriage rights by the Supreme Federal Court, the legalization of civil name and gender changes without surgical or medical requirements (2018), and the criminalization of homophobia and transphobia (2019)—these changes coexist with enduring patterns of social inequality, stigma, and differentiated access to recognition in everyday life. This gap between formal rights and lived protection is illustrated by the persistently elevated levels of homicide and violence against transgender Brazilians and by the shifting federal political climate, in which periods of institutional hostility toward LGBTQIA+ populations have coexisted with, and at times sought to roll back, the formal legal protections recognized by the courts. Anthropological and historical analyses further show that sexual and gender diversity in Brazil has often been simultaneously tolerated, regulated, and marginalised, depending on specific cultural, religious, and political contexts (Fry 2013; Parker 2014). In this sense, legal recognition does not necessarily translate into full social legitimacy or protection in daily interactions, as suggested by broader scholarship on the gap between formal rights and lived experiences, while broader cultural logics of gender, sexuality, and respectability continue to shape lived experiences beyond formal institutional frameworks. This persistent tension between formal recognition and social inequality underscores the importance of situating LGBTQIA+ health and wellbeing within Brazil's historically contingent and socially stratified sexual cultures, making it a particularly relevant context for examining psychosocial outcomes such as loneliness among sexual minority populations.

In addition to structural and relational factors, clinical and behavioral dimensions are also relevant for understanding loneliness among MSM. Emerging evidence suggests that practices such as chemsex and other forms of substance-related sexualized behavior are not intrinsically associated with sexual minority status itself, but may instead reflect psychosocial responses to minority stress, stigma-related social isolation, and unmet emotional or relational needs (Del Pozo-Herce et al. 2024; Hsu et al. 2024; Lagojda et al. 2025; Platteau et al. 2025). In this context, substance use has been described in the literature as being related to psychological distress, relational vulnerability, loneliness, low perceived social support, and difficulties establishing supportive interpersonal connections among sexual minority populations (Gerymski and Magoń 2023). Recent studies have also documented associations between loneliness among MSM and depressive symptoms, emotional dysregulation, reduced community connectedness, and changes in sexual behavior and social interaction patterns, particularly in contexts of heightened social disruption such as the COVID-19 pandemic (e.g., Skakoon-Sparling et al. 2023). These findings reinforce loneliness as an experience embedded within broader contexts of stigma, minority stress, and relational marginalization.

Taken together, these structural, relational, and behavioral dimensions underscore the multidimensional nature of loneliness and the need for empirically grounded approaches capable of capturing its complexity across sociocultural contexts. For instance, the UCLA Loneliness Scale, Version 3, provides a standardized and psychometrically validated tool for assessing loneliness in Brazilian contexts (Kuznier et al. 2016; Mata et al. 2022). However, despite the availability of reliable measurement instruments, empirical evidence remains limited regarding the multidimensional correlates of loneliness among Brazilian MSM, particularly in studies that simultaneously integrate structural, material, relational, community, and behavioral domains within a single analytical framework.

Despite the growing literature on loneliness in sexual minority populations, important gaps remain. While studies from high-income countries have examined loneliness among sexual minority groups (e.g., Gorczynski and Fasoli 2022; Wright et al. 2024), evidence from Brazilian MSM remains scarce. Prior Brazilian research on loneliness in MSM has been limited in scope, typically focused on specific subgroups, single domains, or small conve-

nience samples, and no national Brazilian study has, to our knowledge, simultaneously integrated structural, material, relational, community, religious, and clinical–behavioral domains within a single hierarchical analytical framework. A recent scoping review highlights broader gaps in research on the health, wellbeing, and care of sexual and gender minority populations, including limited availability of context-specific evidence and underrepresentation of psychosocial outcomes in these settings (Frances et al. 2023), which may also extend to constructs such as loneliness. The present study addresses this gap by examining the relative and joint contributions of these domains in a large national sample of Brazilian MSM.

Accordingly, this study had three specific aims: (1) to estimate the prevalence of moderate-to-high loneliness among Brazilian MSM; (2) to examine bivariate associations between loneliness and a comprehensive set of sociodemographic, economic, relational, community, religious, and clinical–behavioral variables; and (3) to test, through a hierarchical multiple linear regression model, the relative contribution of each domain to loneliness while adjusting for sociodemographic confounders. Grounded in a socioecological perspective and informed by Sexual Minority Stress Theory (Meyer 2003), this study seeks to advance understanding of loneliness as a phenomenon that is simultaneously socially structured and subjectively experienced, and to provide an empirical basis for public health strategies aimed at reducing loneliness and strengthening social connections among sexual minority populations.

2. Materials and Methods

2.1. Study Design

This observational, cross-sectional study followed an online, anonymous survey design and was conducted in Brazil between 6 July 2025 and 1 December 2025. The study followed the STROBE reporting guidelines for cross-sectional research. The research is part of an ongoing Brazil–Portugal collaboration on the mental health of LGBTQIA+ populations, coordinated within the Graduate Program in Clinical and Health Psychology of the Department of Psychology and Education at the University of Beira Interior (Covilhã, Portugal), with the active involvement of Brazilian-trained researchers and Brazilian-based collaborators throughout the design, instrument adaptation, recruitment, data interpretation, and writing phases. Cultural and contextual considerations were addressed by recruiting exclusively in Brazil, presenting all study materials in Brazilian Portuguese, and using a Brazilian-validated assessment instrument (the UCLA-LS v3; Kuznier et al. 2016; Mata et al. 2022).

2.2. Participants and Procedure

Participants were recruited between 6 July 2025 and 1 December 2025, through two complementary strategies: targeted paid advertising campaigns on social media platforms (e.g., Meta) and email invitations disseminated through institutional networks and partner organizations (e.g., Brazilian LGBTQIA+ health organizations, community-based NGOs). Eligibility criteria were: (i) age 18 years or older; and (ii) self-identification as a man who has sex with men. Participants accessed an anonymous online questionnaire hosted on Google Forms, which required approximately 15 min for completion. Prior to data entry, all individuals were presented with an electronic informed consent form outlining the voluntary nature of participation, the right to withdraw at any moment, and the procedures ensuring confidentiality and anonymity of the responses.

A total of 1308 individuals provided valid informed consent and completed the questionnaire. Following the application of the predefined inclusion and exclusion criteria, 112 participants (8.6%) were excluded. The primary reason for exclusion was low-quality

and inconsistent questionnaire responses (n = 77; 68.8% of exclusions). These cases were identified through multiple indicators of careless responding, including intra-individual response consistency indices, Mahalanobis distance (to detect multivariate outliers), psychometric synonym consistency checks, and the presence of implausible or aberrant response patterns. Together, these indicators suggested compromised data validity and reliability. Additional exclusions involved participants who did not meet the study's identity or relational criteria (n = 35; 31.3% of exclusions), including transgender men (n = 25; 22.3%), cisgender women (n = 5; 4.5%), and transgender women (n = 5; 4.5%). We acknowledge that trans men who have sex with men meet a behavioral definition of MSM and that their exclusion is a methodological choice rather than a denial of that identity. Three considerations supported this decision. First, the subsample of trans men identified during screening (n = 25) was too small to allow stable estimation of within-group associations and pooling them with cisgender MSM would have obscured subgroup-specific patterns of minority stress. Second, trans MSM face a distinct combination of cisgenderism and sexual minority stress whose effects on social connectedness may differ qualitatively from those experienced by cisgender MSM, such that aggregating the two groups would risk producing average estimates that describe neither population accurately. Third, the recruitment materials targeted MSM communities and may have underrepresented the diversity of trans MSM relational and community contexts. This criterion was applied to ensure conceptual and analytic consistency with the study's operational definition of MSM, understood here as cisgender men assigned male at birth who report sexual activity with men. This approach aims to maintain comparability with epidemiological MSM-focused research, in which gender identity is analytically distinguished from sexual behavior due to their distinct implications for stigma exposure, lived experience, and associated psychosocial outcomes. Therefore, the final sample consisted of 1196 Brazilian MSM with a mean age of 39.96 years (SD = 12.41).

2.3. Instruments

2.3.1. Sociodemographic and Sociocultural Questionnaire

This questionnaire, designed for this study, was administered to characterize the sample in terms of personal, social, economic, and contextual variables. Information was collected on sexual orientation, self-identified race/color (assessed using the five mutually exclusive categories of the Brazilian Institute of Geography and Statistics: white, black, brown [parda, denoting mixed-race ancestry], yellow [Asian], and indigenous, with single-choice response, consistent with national census and Brazilian health-research practice), educational level, relationship status, employment situation, monthly income, living arrangement, and subjective economic vulnerability. The questionnaire also included psychosocial and community variables, such as sense of belonging to the LGBTQIA+ community and the composition of participants' main social networks according to sexual orientation. Religiosity variables included formal religious affiliation and active engagement in religious practices. Health and behavioral variables comprised substance use to intensify or prolong sexual activity during the previous year, frequency of alcohol, cannabis, and other drug use in the previous 12 months, problematic substance use in the previous 3 years, and HIV serostatus.

2.3.2. UCLA Loneliness Scale, Version 3 (UCLA-LS v3)

Loneliness was measured with the UCLA-LS v3 (Russell 1996), which was translated and culturally adapted for Brazilian Portuguese and later psychometrically evaluated in a Brazilian sample (Mata et al. 2022). The scale is a unidimensional measure composed of 20 items (9 positively worded and 11 negatively worded), rated on a four-point Likert scale

ranging from 1 ("never") to 4 ("always"). Positively worded items are reverse-scored, and the total score ranges from 20 to 80, with higher scores indicating greater loneliness. For interpretive purposes, scores of 60 or higher were considered high loneliness, and scores between 50 and 59 were considered moderate loneliness; scores below 50 indicated lower loneliness. In a Brazilian validation study with older adults, evidence of construct validity (KMO = 0.78; Bartlett's $\chi^2(190) = 1467.9$; one-factor solution explaining 43.6% of the variance; factor loadings from 0.43 to 0.76; RMSEA = 0.056; CFI = 0.971; TLI = 0.967), convergent and discriminant validity, and good internal consistency ($\alpha = 0.88$) were reported (Kuznier et al. 2016; Mata et al. 2022). In this study, both Cronbach's alpha and McDonald's omega were 0.95 for the total scale.

2.4. Ethics

This study was approved by the Ethics Committee for Human Research of the Graduate Program in Clinical and Health Psychology, Faculty of Social and Human Sciences, University of Beira Interior, on 15 October 2024 (CE-UBI-Pj-2024-086-ID2760). All study procedures were conducted in accordance with the Declaration of Helsinki, and the study posed no foreseeable risks to participants.

2.5. Data Analysis

All statistical analyses were performed using IBM SPSS Statistics software, version 29. Descriptive analyses were first conducted to characterize the sample. Absolute and relative frequencies were calculated for categorical variables, and measures of central tendency and dispersion (mean and standard deviation) were calculated for continuous variables.

To justify the selection of variables for the multivariate model, preliminary bivariate analyses (independent samples *t*-tests and one-way ANOVAs) were conducted to compare mean loneliness scores across groups. Only variables that demonstrated a statistically significant association ($p < 0.05$) with loneliness were retained. For instance, geographical characteristics (e.g., city size) and certain demographics (e.g., race/color, sexual orientation) were excluded from subsequent models due to a lack of significant bivariate associations. Pearson correlation coefficients were then computed to examine bivariate associations among the selected predictors and to initially rule out severe multicollinearity.

For the hierarchical multiple regression analysis, the analytical sample was reduced from $N = 1196$ to $N = 1121$ due to missing data on one or more selected variables. Missing values were handled using listwise deletion, ensuring that all included cases had complete data for the predictors and outcome variable (Tabachnick and Fidell 2019).

To assess the relative impact of structural conditions, material precarity, social/community support, and clinical–behavioral factors on loneliness, a hierarchical multiple linear regression model was estimated. Before model estimation, assumptions were examined and met. The absence of multicollinearity was confirmed by tolerance values (minimum = 0.47) and variance inflation factors (VIF; maximum = 2.11), both within acceptable thresholds. The normality of residuals was supported by skewness (−0.019) and kurtosis (−0.403). Furthermore, a post hoc power analysis using G*Power v3.1.9.7 confirmed that, for a model with 15 predictors (including dummy categories) and $\alpha = 0.05$, the analytical sample size ($N = 1121$) provided statistical power > 0.99 to detect small effect sizes, well above standard requirements, indicating ample power for the planned analysis.

The criteria used to select and hierarchically structure the variables were deductive and informed by Sexual Minority Stress Theory (Meyer 2003) and the Social Determinants of Health framework. Specifically, the model was designed to examine the relationship between material precarity and loneliness in the context of intragroup social capital, while controlling for potential syndemic health factors. Accordingly, independent variables

were entered in four theoretically grounded sequential blocks: Block 1 (sociodemographic control) included age, educational level, and absolute monthly income; Block 2 (material precarity) included subjective economic vulnerability and occupational category, with formal employment as the reference category; Block 3 (social and community support) included relationship status, sense of community, social-network composition predominantly consisting of LGBTQIA+ peers (with mostly heterosexual networks as the reference category), and absence of formal religion; and Block 4 (clinical–behavioral factors) included problematic substance use, alcohol consumption, and HIV serostatus. Model fit was evaluated using R^2 and ΔR^2, and a significance level of $p < 0.05$ was adopted for all analyses.

3. Results

3.1. Sample Characteristics

The final sample comprised 1196 Brazilian MSM. However, the analytical sample varied slightly across analyses depending on the variables included. Table 1 shows the sociodemographic, relational, community, and health characteristics of the sample, together with the results of the preliminary bivariate analyses.

In the sociodemographic and economic domains, loneliness levels were significantly higher among participants with lower education, $F(3, 1192) = 4.08$, $p < 0.001$; those who were unemployed, $F(4, 1187) = 6.03$, $p < 0.001$; and those in the lowest income brackets, $F(2, 1165) = 21.00$, $p < 0.001$. Consistently, men who reported subjective economic vulnerability had substantially higher loneliness scores than those who did not, $t(1189) = 9.06$, $p < 0.001$. Conversely, demographic variables such as sexual orientation, $F(3, 1192) = 1.79$, $p = 0.128$, and race/color, $F(3, 1191) = 0.70$, $p = 0.626$, did not yield statistically significant differences in loneliness.

Regarding relational and residential contexts, single men without a partner reported significantly higher loneliness than married or cohabiting individuals, $F(4, 1188) = 28.85$, $p < 0.001$. Living alone or with family members was also associated with higher loneliness compared with living with a romantic partner, $F(2, 1191) = 29.96$, $p < 0.001$. Intragroup social capital demonstrated a strong protective association: participants who reported a frequent sense of belonging to the LGBTQIA+ community, $F(2, 1193) = 16.42$, $p < 0.001$, and those whose social networks had a balanced or predominantly LGBTQIA+ composition, $F(2, 1193) = 21.76$, $p < 0.001$, exhibited substantially lower loneliness levels. The absence of a formal religion was also associated with greater loneliness, $F(4, 1174) = 3.13$, $p = 0.003$, whereas active religious practice did not produce significant differences, $F(2, 1188) = 2.11$, $p = 0.122$.

In the clinical and behavioral domain, higher levels of loneliness were significantly associated with problematic substance use in the previous three years, $t(1194) = 3.58$, $p < 0.001$, and with alcohol abstinence, $F(2, 1193) = 8.43$, $p < 0.001$. Additionally, significant differences were observed across HIV serostatus groups, $F(2, 1192) = 7.77$, $p < 0.001$: the highest mean loneliness scores were found among those who had never been tested or did not know their status, followed by participants living with HIV. Factors such as substance use specifically to intensify sexual practices, $t(1194) = -0.001$, $p = 1.000$, and the frequency of cannabis or other drug use, $F(2, 1193) = 1.94$, $p = 0.102$, did not show significant associations.

Table 1. Sample characteristics of Brazilian MSM (N = 1196).

Variable	Category	*n*	%	Loneliness Score Mean (*SD*)	Test Statistic	*p*
Sociodemographic characteristics						
Sexual orientation					F = 1.791	0.128
	Gay	1003	83.9	49.42 (13.76)		
	Bisexual	150	12.5	52.21 (13.11)		
	Pansexual	42	3.5	51.87 (13.65)		
	Other	1	0.1	50.91 (15.11)		
Race/color					F = 0.696	0.626
	White	714	59.7	49.99 (13.74)		
	Black	112	9.4	50.18 (13.66)		
	Brown	355	29.7	49.51 (13.76)		
	Other (Asian/Indigenous)	14	1.1	52.14 (12.01)		
Education level					F = 4.080	<0.001
	Low (up to completed secondary school)	116	9.8	53.53 (12.82)		
	Middle (technical training, undergraduate degree, or incomplete graduate study)	578	48.3	49.88 (13.78)		
	High (completed graduate degree, master's, or doctorate)	499	41.6	48.21 (13.35)		
	Other	3	0.3	49.00 (14.15)		
Employment status					F = 6.032	<0.001
	Self-employed	254	21.2	48.25 (14.07)		
	Formal employee (CLT contract)	609	51.0	49.03 (13.45)		
	Student	144	12.1	51.99 (12.69)		
	Unemployed	95	7.9	57.88 (12.26)		
	Other	90	7.5	47.43 (14.66)		
Monthly income					F = 21.000	<0.001
	Low (≤BRL 2500)	355	29.7	53.74 (12.78)		
	Middle (BRL 2501 to BRL 10,000)	593	49.6	48.82 (13.65)		
	High (>BRL 10,000)	220	18.4	45.32 (13.59)		
Economic vulnerability					t = 9.061	<0.001
	Yes	150	12.5	58.53 (12.33)		
	No	1041	87.1	48.58 (13.43)		
Relational and residential context						
Relationship status					F = 28.851	<0.001
	Single, without a partner	582	48.6	53.48 (12.92)		
	Single, with a partner	255	21.3	48.05 (13.79)		
	Married or cohabiting	283	23.7	43.75 (12.69)		
	Divorced or separated	60	5.0	51.25 (14.43)		
	Other	13	1.1	50.82 (14.17)		
Living arrangement					F = 29.960	<0.001
	Living alone	363	30.4	50.44 (13.43)		
	With a romantic partner	343	28.7	44.69 (13.05)		
	With family members or friends	488	40.9	53.07 (13.32)		

Table 1. *Cont.*

Variable	Category	*n*	%	Loneliness Score Mean (*SD*)	Test Statistic	*p*
Religion and community						
Formal religion					$F = 3.128$	0.003
	Christian	353	29.5	49.10 (13.35)		
	Spiritist	134	11.2	47.19 (13.04)		
	Agnostic	326	27.3	50.09 (14.26)		
	Atheist	179	15.0	52.93 (13.71)		
	Other	187	15.6	52.32 (12.96)		
Active religious practice					$F = 2.109$	0.122
	Yes, frequently	164	13.7	48.21 (13.19)		
	Yes, occasionally	295	24.7	49.56 (12.83)		
	No	732	61.2	50.47 (14.14)		
Sense of belonging to the LGBTQIA+ community					$F = 16.417$	<0.001
	Low (none/little)	241	20.2	54.71 (14.33)		
	Sometimes	302	25.2	51.42 (13.31)		
	Frequent (frequently/always)	653	54.6	47.54 (13.20)		
Main social-network composition					$F = 21.762$	<0.001
	Mostly heterosexual	799	66.9	52.09 (13.78)		
	Balanced heterosexual and LGBTQIA+	284	23.7	44.65 (12.01)		
	Mostly LGBTQIA+	113	9.4	47.98 (13.35)		
Health and behavioral characteristics						
Substance use to intensify or prolong sex in the last year					$t = -0.001$	1.000
	Yes	275	23.0	49.91 (13.79)		
	No	921	77.0	49.91 (13.69)		
Problematic substance use					$t = 3.584$	<0.001
	Yes	152	12.7	53.65 (12.71)		
	No	1044	87.3	49.42 (13.76)		
Alcohol use frequency in the last 12 months					$F = 8.429$	<0.001
	Never	167	14.0	53.83 (13.47)		
	Occasionally	750	62.7	49.69 (13.62)		
	Frequently	279	23.3	48.11 (13.65)		
Cannabis use frequency in the last 12 months					$F = 1.936$	0.102
	Never	836	70.0	50.26 (13.80)		
	Occasionally	236	19.7	49.11 (13.56)		
	Frequently	124	10.3	49.12 (13.23)		
Other drug use frequency in the last 12 months					$F = 1.936$	0.102
	Never	994	83.2	49.64 (13.82)		
	Occasionally	179	14.9	50.58 (13.06)		
	Frequently	23	1.9	55.96 (13.12)		

Table 1. *Cont.*

Variable	Category	*n*	%	Loneliness Score Mean (*SD*)	Test Statistic	*p*
HIV serostatus					$F = 7.772$	<0.001
	Positive	198	16.6	50.32 (14.00)		
	Negative	885	73.9	49.22 (13.72)		
	Never tested/do not know	112	9.4	54.29 (12.37)		

Note. *p*-values derived from independent samples *t*-tests (for dichotomous variables) and one-way ANOVAs (for categorical variables with 3 or more groups) comparing mean UCLA Loneliness scores. *SD* = standard deviation. Frequencies were calculated using valid responses. Missing data ranged from 0.1% to 2.3% across variables. Percentages may not sum to 100.0 due to rounding and missing values.

3.2. Loneliness Levels

Regarding loneliness levels, 317 participants (26.5%) reported high loneliness, 313 (26.2%) reported moderate loneliness, and 566 (47.3%) reported lower loneliness. In total, 52.7% of the sample scored in the moderate or high range.

Item-level distributions are presented in Table 2. Across most items, the modal response category was 'sometimes,' suggesting a pattern of moderate loneliness with alternating experiences of connection and disconnection. For example, 51.7% of participants reported sometimes feeling in tune with others, and 32.9% reported sometimes feeling part of a group of friends. At the same time, substantial proportions reported recurrent emotional isolation, such as feeling that no one really knows them well (35.0% always) or lacking companionship (27.9% always). The data, therefore, suggest that even when some degree of social contact is preserved, a meaningful proportion of participants experience fragile or inconsistent relational closeness.

Table 2. Percentage distribution of responses to the UCLA-LS v3.

UCLA-LS V3 Item	1	2	3	4
How often do you feel "in tune" with the people around you?	6.9	28.3	51.7	13.1
How often do you feel that you lack companionship?	11.9	22.9	37.3	27.9
How often do you feel that there is no one you can turn to?	25.3	25.8	28.6	20.3
How often do you feel alone?	14.5	26.6	33.1	25.6
How often do you feel part of a group of friends?	12.0	30.6	32.9	24.4
How often do you feel that you have a lot in common with the people around you?	13.5	35.6	37.5	13.0
How often do you feel that no one is close to you?	21.4	27.7	32.9	18.1
How often do you feel that your interests and ideas are shared by the people around you?	10.9	30.6	37.0	21.2
How often do you feel outgoing and friendly?	5.7	21.3	43.2	29.7
How often do you feel close to people?	6.6	30.2	43.6	19.4
How often do you feel left out?	14.0	31.4	36.3	18.0
How often do you feel that your relationships with others are meaningful?	25.2	29.3	31.5	14.0
How often do you feel that no one really knows you well?	10.8	23.4	30.6	35.0

Table 2. *Cont.*

UCLA-LS V3 Item	1	2	3	4
How often do you feel isolated from others?	16.8	27.4	31.8	23.8
How often do you feel that you can find companionship when you want it?	21.8	31.7	28.8	17.1
How often do you feel that there are people who really understand you?	14.5	34.7	35.9	14.5
How often do you feel shy (inhibited/embarrassed)?	10.8	33.0	35.9	20.2
How often do you feel that people are around you, but not with you?	10.8	30.3	35.5	23.2
How often do you feel that there are people you can talk to?	10.4	28.3	35.0	26.2
How often do you feel that there are people you can count on?	11.4	29.2	33.8	25.6

Note. N = 1190–1196. Response categories: 1 = Never; 2 = Rarely; 3 = Sometimes; 4 = Always.

3.3. Associations Between Sociodemographic and Sociocultural Variables and Loneliness

Bivariate associations among the significant variables are shown in Table 3. Overall, loneliness was negatively associated with indicators of socioeconomic stability (age, income, and education), being in a romantic relationship, and markers of intragroup social capital (sense of belonging and LGBTQIA+ network composition). Conversely, it was positively associated with risk factors such as economic vulnerability, absence of formal religion, and problematic substance use.

Table 3. Correlations between sociodemographic and sociocultural variables and loneliness.

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Loneliness	–											
2. Age	−0.17 ***	–										
3. Monthly income	−0.23 ***	0.45 ***	–									
4. Education level	−0.14 ***	0.28 ***	0.55 ***	–								
5. Economic vulnerability	0.23 ***	−0.04	−0.31 ***	−0.22 ***	–							
6. In a relationship	−0.28 ***	0.14 ***	0.28 ***	0.26 ***	−0.06 *	–						
7. Sense of community	−0.22 ***	−0.16 ***	0.00	0.05	−0.05	0.13 ***	–					
8. LGBTQIA+ peer network	−0.22 ***	−0.06	−0.01	0.04	−0.06	0.05	0.29 ***	–				
9. No formal religion	0.06 *	−0.20 ***	−0.04	−0.02	−0.03	0.03	0.10 ***	0.06	–			
10. Problematic substance use	0.11 ***	−0.02	−0.03	−0.05	0.13 ***	−0.11 ***	0.05	0.05	0.06 *	–		
11. Alcohol consumption	−0.14 ***	0.07 *	0.14 ***	0.14 ***	−0.03	0.06 *	0.09 **	0.10 ***	0.00	0.21 ***	–	
12. Living with HIV	0.03	0.16 ***	0.04	0.02	0.07*	0.00	0.02	0.01	−0.03	0.06	0.01	–

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Intercorrelations among the contributing variables ranged from low to moderate. The highest association was observed between education and income, with all relationships remaining well below the threshold for multicollinearity. This confirms the suitability and independence of the selected variables for the multiple regression analysis.

3.4. Sociodemographic and Sociocultural Variables Associated with Loneliness

To examine the relative contribution of structural and social variables, a hierarchical multiple linear regression was estimated (Table 4). The final model was statistically significant and explained 23% of the variance in loneliness. Although sociodemographic and

material variables contributed significantly to the first two blocks, the inclusion of social and community support variables produced the largest increase in explained variance.

Table 4. Summary of the hierarchical multiple regression analysis.

Variable	Model 1			Model 2			Model 3			Model 4			95% CI
	B	*SE*	β	*B*	*SE*	β	*B*	*SE*	β	*B*	*SE*	β	[LL, UL]
Constant	73.81	1.15		70.31	1.39		75.42	2.34		70.62	2.44		[65.83, 75.41]
Age	−0.09	0.04	−0.08 *	−0.14	0.04	−0.12 ***	−0.16	0.04	−0.14 ***	−0.17	0.04	−0.15 ***	[−0.24, −0.09]
Absolute monthly income	−1.88	0.39	−0.18 ***	−1.18	0.43	−0.11 **	−0.78	0.40	−0.08	−0.74	0.40	−0.07	[−1.52, 0.04]
Education level	−0.12	0.24	−0.02	−0.02	0.24	−0.00	0.37	0.23	0.05	0.44	0.22	0.06 *	[0.00, 0.88]
Economic vulnerability				7.51	1.30	0.18 ***	7.43	1.22	0.18 ***	6.84	1.22	0.16 ***	[4.45, 9.23]
Occupation: Self-employed				−1.74	0.99	−0.05	−1.10	0.93	−0.03	−1.16	0.92	−0.04	[−2.96, 0.64]
Occupation: Student				−1.63	1.47	−0.04	−1.08	1.39	−0.03	−1.02	1.38	−0.02	[−3.74, 1.69]
Occupation: Unemployed				2.69	1.73	0.05	2.14	1.62	0.04	1.85	1.61	0.03	[−1.30, 5.00]
Occupation: Other				1.01	1.71	0.02	0.43	1.60	0.01	0.82	1.59	0.02	[−2.29, 3.94]
In a relationship							−5.88	0.78	−0.21 ***	−5.51	0.78	−0.20 ***	[−7.04, −3.98]
Sense of community							−1.75	0.31	−0.16 ***	−1.75	0.31	−0.16 ***	[−2.36, −1.15]
LGBTQIA+ peer network							−2.41	0.43	−0.16 ***	−2.37	0.43	−0.15 ***	[−3.21, −1.52]
No formal religion							2.01	0.76	0.07 **	1.82	0.75	0.07 *	[0.34, 3.30]
Problematic substance use										4.21	1.20	0.10 ***	[1.86, 6.56]
Alcohol consumption										−1.25	0.35	−0.10 ***	[−1.93, −0.56]
Living with HIV										1.69	1.00	0.05	[−0.26, 3.64]
R^2		0.057			0.097			0.213			0.230		
Delta R^2		0.057 ***			0.040 ***			0.116 ***			0.017 ***		
Model *F*		22.53 ***			14.86 ***			24.96 ***			21.96 ***		
Delta *F*		22.53 ***			9.73 ***			40.89 ***			8.07 ***		

Note. β = standardized coefficient; B = unstandardized coefficient; *SE* = standard error; 95% CI = 95% confidence interval; LL = lower limit; UL = upper limit. For occupation, formal employment was the reference category. For peer-network composition, mostly heterosexual networks served as the reference category. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In the final model, younger age and greater economic vulnerability were linked to loneliness. Being in a romantic relationship, reporting a stronger sense of community, and having a social network composed predominantly of LGBTQIA+ peers were linked to lower loneliness. The absence of a formal religion was independently related to higher loneliness. Among the clinical–behavioral variables, problematic substance use was linked to higher loneliness, whereas alcohol consumption showed a negative relationship. HIV serostatus was not significantly related to loneliness after adjustment.

4. Discussion

The findings indicate that a substantial proportion of the present sample of Brazilian MSM reported moderate-to-high loneliness, and that loneliness in this sample was associated with an interplay of economic, relational, community, and behavioral factors.

More than half of the sample (52.7%) scored in the moderate or high range, suggesting that loneliness in sexual minority populations may not be an incidental experience but a salient public health concern (Brumfield and Dahlenburg 2025; Gorczynski and Fasoli 2022; World Health Organization 2025). Because the present study did not include a comparison group, prevalence claims relative to non-MSM Brazilian populations are not warranted, and the figures reported here are best interpreted as descriptive of the present sample. Notably, the item-level distribution suggests not only the presence of loneliness but also its qualitative pattern, that is, participants frequently reported alternating experiences of connection and disconnection, alongside persistent perceptions of not being deeply known or understood. This pattern aligns with contemporary conceptualizations of loneliness as a discrepancy between desired and actual relational depth, rather than merely the absence of social contact (Hawkley and Cacioppo 2010; Holt-Lunstad 2022).

The magnitude of loneliness observed here is in line with prior research reporting elevated loneliness among sexual minority populations relative to heterosexual populations. These patterns are often interpreted within the sexual minority stress framework (Meyer 2003), which posits that chronic exposure to stigma, discrimination, and social exclusion may undermine relational security and belonging (Elmer et al. 2022; Herrmann et al. 2023; Pinazo-Hernandis et al. 2025; van der Star 2024; Wright et al. 2024). Because the present study is cross-sectional and non-comparative, the associations reported here cannot be interpreted as evidence of causal effects or of disparities relative to non-MSM populations; they describe within-sample patterns observed at a single time point.

Economic vulnerability emerged as one of the most robust correlates of loneliness. This result is consistent with recent research emphasizing that material deprivation constrains social participation, limits access to resources, and may intensify the subjective experience of social disconnection (Beller 2024; Graham et al. 2024). Importantly, subjective economic vulnerability remained significant even after controlling for income and occupation, suggesting that perceived economic insecurity may be particularly relevant for understanding relational distress. This finding supports broader evidence that subjective socioeconomic status is closely linked to mental health outcomes, potentially through mechanisms such as reduced perceived control, social comparison, and anticipatory stress.

Age also showed a consistent negative association with loneliness, indicating that younger MSM reported higher loneliness levels. This finding is in line with previous research suggesting that younger sexual minority individuals may face heightened relational instability, identity-related stress, and challenges in accessing supportive networks, particularly in contexts marked by persistent stigma (Elmer et al. 2022; van der Star 2024). It may also reflect cohort-specific dynamics, including greater reliance on digital forms of interaction that do not necessarily translate into perceived relational closeness.

The strongest protective factors were found in the relational and community domains. Being in a romantic relationship, feeling part of the LGBTQIA+ community, and maintaining networks with a stronger presence of LGBTQIA+ peers were all associated with lower loneliness. These findings resonate with studies showing that community connection, resilience, and identity-affirming ties can mitigate the impact of minority stress and reduce social isolation (De Jesus et al. 2024; Elmer et al. 2025; Oeser et al. 2025; Polonijo et al. 2024). Mentorship and supportive identity-related spaces may further strengthen these protective mechanisms by improving validation and access to meaningful social engagement (Charmaraman et al. 2024; Huang et al. 2024). Taken together, these patterns suggest that community should not be understood only as network density or frequency of contact, but as a relational and symbolic process of belonging and identity validation, where belonging emerges through repeated experiences of recognition, safety, and identity

affirmation within specific social environments (e.g., Hawkley and Cacioppo 2010; De Jesus et al. 2024; Elmer et al. 2025).

In the Brazilian context, interpretations of the present findings must also be situated within broader socio-historical dynamics shaping sexuality, race, and religion. Scholarship on Brazilian sexual cultures shows that same-sex desire and LGBTQIA+ identities have historically been negotiated within shifting regimes of visibility, morality, and social regulation, rather than following a linear trajectory of inclusion or exclusion (Green 1999; Parker 2014; Fry 2013). Within this structurally heterogeneous landscape, belonging is unevenly distributed and shaped by historically embedded social norms and institutions. Religious contexts are not uniformly exclusionary for LGBTQIA+ individuals, as affirming religious spaces have been shown to provide emotional support, identity validation, and community belonging in specific settings (Ben-Lulu 2024). In parallel, racialized LGBTQIA+ individuals in Brazil may develop distinct forms of social organization and identity negotiation in response to intersecting racial and sexual marginalization, with community networks functioning as spaces of resistance, affirmation, and collective support (Ratts 2007). These dynamics reinforce the idea that access to belonging is not uniformly distributed, but instead shaped by intersecting historical and structural conditions that structure opportunities for recognition, protection, and social integration. Future research should further examine how these historically embedded intersections of sexuality, race, and religion operate in shaping lived experiences of loneliness and belonging among LGBTQIA+ populations in Brazil, particularly across different social and institutional contexts.

Building on these broader contextual considerations, a further notable finding relates to religious affiliation. The absence of a formal religion was associated with higher levels of loneliness, suggesting that religious contexts may operate as relevant but heterogeneous spaces of social integration. On the one hand, formal religious affiliation may function as a marker of institutional integration and access to organized social networks. On the other hand, religiosity is not uniformly protective for sexual minorities, particularly when religious settings reproduce stigma or internalized homonegativity. Brazilian evidence suggests that religious affiliation may intersect with depressive symptoms and internalized homonegativity in complex ways (Alckmin-Carvalho et al. 2024; Batista et al. 2024). This indicates that religious contexts can function as ambivalent social environments that either constrain or enable processes of belonging, depending on whether they provide recognition, safety, and identity affirmation. Consistent with broader conceptualizations of belonging as a dynamic relational process emerging through repeated experiences of validation within specific social environments (Hawkley and Cacioppo 2010; De Jesus et al. 2024; Elmer et al. 2025), this finding likely reflects access to socially structured opportunities for connection rather than a straightforward protective effect of religiosity itself. Future research should further explore how affirming and non-affirming religious spaces shape experiences of loneliness among LGBTQIA+ populations in Brazil, including the role of inclusive congregations as potential sites of belonging, recognition, and emotional support within contexts of minority stress.

Problematic substance use was positively associated with loneliness in the adjusted model. This result is compatible with recent literature indicating that substance-related practices, including chemsex, may be linked to psychosocial distress, harm reduction challenges, and attempts to cope with shame, exclusion, or emotional pain among MSM (Del Pozo-Herce et al. 2024; Hsu et al. 2024; Lagojda et al. 2025; Platteau et al. 2025). Although the present study cannot establish directionality, the findings suggest that problematic use may signal a cluster of vulnerabilities in which loneliness is embedded.

The negative association between alcohol consumption and loneliness should be interpreted cautiously. It does not indicate that alcohol has a protective effect per se, but

highlights the need to distinguish between behavioral indicators and the social contexts in which they occur. A more plausible interpretation is that alcohol use frequency partly captured participation in social contexts in which drinking occurs, rather than a beneficial pharmacological effect. Similar caution is warranted when interpreting associations between loneliness and sexual behavior or social contact patterns during periods of disruption (Skakoon-Sparling et al. 2023).

Finally, HIV serostatus was not significantly associated with loneliness in the adjusted model, suggesting that loneliness in this sample was more closely related to social and relational determinants than to biomedical status alone. This interpretation aligns with studies indicating that psychosocial and sexual health outcomes among MSM living with and without HIV are strongly shaped by resilience, support, and broader social conditions (De Jesus et al. 2024; Scofield et al. 2024).

Despite the robustness of the final model, a substantial proportion of the variance in loneliness (77%) remained unexplained, underscoring the multifactorial and context-dependent nature of this phenomenon. This residual variance likely reflects the influence of unmeasured psychological, relational, and structural dimensions, including mental health conditions, attachment styles, internalized stigma, experiences of discrimination, and the quality, rather than merely the presence of social ties. In addition, contemporary forms of social interaction, particularly those mediated by digital platforms and geosocial networking applications, may play an increasingly relevant yet complex role in shaping perceived connectedness among MSM. These findings suggest that loneliness cannot be fully understood through static or purely structural indicators, but instead emerges from dynamic interactions between individual vulnerabilities, relational processes, and broader socio-cultural environments. Taken together, the results highlight the need to move beyond conventional explanatory models and to incorporate more nuanced, multilevel, and intersectional approaches capable of capturing the lived complexity of loneliness. Advancing this line of research will be critical not only for improving theoretical understanding but also for informing more precise and context-sensitive interventions, particularly those addressing stigma, relational quality, and access to affirming social spaces.

Strengths, Limitations, and Future Directions

Several strengths of the present study should be highlighted. First, the sample size (N = 1196) is large by the standards of psychosocial research with Brazilian MSM. Second, the analytical model integrates structural, material, relational, community, religious, and clinical–behavioral domains within a single hierarchical regression, allowing examination of the relative contribution of each domain after adjustment for the others. Third, loneliness was assessed with the UCLA-LS v3, an instrument with established Brazilian psychometric evidence (Kuznier et al. 2016; Mata et al. 2022), and internal consistency in the present sample was excellent ($\alpha = \omega = 0.95$). Fourth, multiple indicators of careless responding were systematically applied prior to analysis, supporting the validity of the retained data. Fifth, the analyses are theoretically grounded in Sexual Minority Stress Theory (Meyer 2003) and the Social Determinants of Health framework, providing an explicit conceptual anchor for the variable selection and the hierarchical block structure.

This study also has important limitations that should be acknowledged. First, its cross-sectional design precludes causal inferences regarding the direction of the observed associations; accordingly, the term "contributor" was preferred over "predictor," and all interpretations are framed in associational terms. Second, the online, nonprobability sampling strategy, anchored in paid social-media advertising and convenience email lists, limits generalizability and may have overrepresented MSM who are digitally connected, more identity-disclosed, or already engaged with LGBTQIA+ networks. Third, the absence

of a comparison group precludes claims of higher-than-expected prevalence relative to other Brazilian populations. Fourth, all measures were self-reported and may be subject to social desirability bias, recall error, and common-method variance. Fifth, the UCLA-LS v3 captures the subjective psychological dimension of loneliness but does not measure objective social isolation; the two constructs, while related, are not interchangeable. Sixth, complex constructs such as religiosity, social support, and community involvement were assessed briefly and did not capture their quality, intensity, or ambivalence. Seventh, the analytical decision to restrict the sample to cisgender MSM excluded transgender men (n = 25), whose loneliness experiences merit dedicated investigation in future research, given their distinct minority-stress profiles, healthcare access patterns, and community network compositions. Eighth, although 23% of the variance may appear modest, this magnitude is consistent with multilevel psychosocial models and underscores the inherently complex, context-dependent nature of loneliness. Future studies should adopt longitudinal and mixed-methods designs to better capture the dynamic and contextual nature of loneliness among MSM and to clarify temporal and potentially bidirectional relationships between loneliness and its associated factors. In particular, qualitative approaches may provide deeper insight into the subjective meaning of loneliness and the relational and identity-based processes underlying the patterns observed here. There is also a need to expand regional, racial, and socioeconomic diversity in future samples, to incorporate more refined and multidimensional measures of stigma (e.g., enacted, internalized), social support, and network quality, and to attend more systematically to intersectional factors, including race, geography, and age cohorts. Finally, further research should account for potential confounding variables such as psychological morbidity (e.g., anxiety and depressive symptoms), resilience, attachment patterns, and experiences of stigma and discrimination.

5. Conclusions

Overall, within the present cross-sectional sample of Brazilian MSM, loneliness was associated with greater subjective economic vulnerability, problematic substance use, and the absence of formal religious affiliation, and was inversely associated with being in a romantic relationship, reporting a stronger sense of belonging to the LGBTQIA+ community, and having a social network composed predominantly of LGBTQIA+ peers. These within-sample associations are consistent with socioecological approaches that position social connection, community belonging, and material conditions as relevant correlates of mental health among sexual minority populations. The findings should not be interpreted as evidence of causal pathways or of disparities relative to non-MSM Brazilian populations; they are best read as hypothesis-generating patterns that may inform the design of future longitudinal and intervention studies. Within these interpretive limits, the results are compatible with the broader proposition that addressing loneliness among Brazilian MSM may require integrated strategies that simultaneously attend to material conditions and to the availability of affirming social environments.

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Abbreviations

The following abbreviations are used in this manuscript:

MSM	Men who have sex with men
UCLA-LS v3	UCLA Loneliness Scale, Version 3
HIV	Human immunodeficiency virus
LL	Lower limit
UL	Upper limit
CI	Confidence interval

References

Alckmin-Carvalho, Felipe., António Oliveira, Patricia Silva, Madalena Cruz, Lúcia Nichiata, and Henrique Pereira. 2024. Religious affiliation, internalized homonegativity and depressive symptoms: Unveiling mental health inequalities among Brazilian gay men. *International Journal of Environmental Research and Public Health* 21: 1167. [CrossRef]

Batista, Thales S., Filipe M. de Pinho Tavares, Gabriela P. Gonçalves, and Juliana L. Torres. 2024. Internalized homophobia and depression in homosexual and bisexual men and women: LGBT+ health survey, 2020 [Homofobia internalizada e depressão em homens e mulheres homossexuais e bissexuais: Inquérito de saúde LGBT+, 2020]. *Ciência & Saúde Coletiva* 29: e05412023. [CrossRef]

Beller, Johannes. 2024. Social inequalities in loneliness: Disentangling the contributions of education, income, and occupation. *SAGE Open* 14: 21582440241. [CrossRef]

Ben-Lulu, Elazar. 2024. Celebrating fifty years of Jewish pride: An autoethnographic view on queerness, diaspora and homeland in an American gay synagogue. *Religions* 15: 550. [CrossRef]

Brumfield, Eeric W., and Sophie C. Dahlenburg. 2025. Experiences of loneliness among gay men: A systematic review and meta-synthesis. *Journal of Homosexuality* 73: 1039–85. [CrossRef] [PubMed]

Charmaraman, Linda, Alice Zhang, Kaitlyn Wang, and Becky Chen. 2024. Sexual minorities and loneliness: Exploring sexuality through social media and gender–sexuality alliance (GSA) supports. *International Journal of Environmental Research and Public Health* 21: 300. [CrossRef] [PubMed]

De Jesus, Maria, Deanna Ware, Steven Meanley, Mark Brennan-Ing, Chukwuemeka N. Okafor, Steve Shoptaw, Sabina Haberlen, Valentina Stosor, M. Reuel Friedman, and Michael Plankey. 2024. Disrupting the path from depression to loneliness: Multilevel resilience among older sexual minority men with and without HIV. *AIDS and Behavior* 28: 3574–86. [CrossRef]

Del Pozo-Herce, Pablo, Alberto Tovar-Reinoso, Antonio Martínez-Sabater, Elena Chover-Sierra, Teresa Sufrate-Sorzano, Carlos Saus-Ortega, Javier Curto-Ramos, José M. Padilla-Brito, Carlos González-Navajas, Eva Baca-García, and et al. 2024. Exploration of mental health elements in chemsex behavior: Interventions, influencing factors, and attitudes towards risk and harm reduction in Spain. *Nursing Reports* 14: 2313–26. [CrossRef]

Dharma, Christoffer, Petter M. Smith, Michael Escobar, Travis Salway, Victoria Landsman, Ben Klassen, Nathan J. Lachowsky, and Dionne Gesink. 2024. Improving prevalence estimates of mental health and well-being indicators among sexual minority men: A propensity-weighting approach. *American Journal of Epidemiology* 193: 1758–67. [CrossRef]

Elmer, Eddy M., van Theo G. Tilburg, and Tineke Fokkema. 2025. Age and gender identity in the relationship between minority stress and loneliness: A global sample of sexual and gender minority adults. *The Journal of Sex Research* 62: 1080–99. [CrossRef]

Elmer, Eddy M., van Theo Tilburg, and Tineke Fokkema. 2022. Minority stress and loneliness in a global sample of sexual minority adults: The roles of social anxiety, social inhibition, and community involvement. *Archives of Sexual Behavior* 51: 2269–98. [CrossRef] [PubMed]

Frances, Cara, Camille Garnsey, and Jessica DeMulder. 2023. Neglected gaps in improving the health, wellbeing, and care for sexual and gender minority young people living in low- and lower-middle- income countries: A scoping review. *BMC Public Health* 23: 1664. [CrossRef]

Freitas, Lucilene, Thiago S. Torres, Brenda Hoagland, Mayara S. T. Silva, Valdiela G. Veloso, Beatriz Grinsztejn, João L. Bastos, and Paula M. Luz. 2024. Discriminatory experiences among gay, bisexual, and other men who have sex with men, and transgender and non-binary individuals: A cross-sectional analysis. *The Lancet Regional Health–Americas* 33: 100737. [CrossRef] [PubMed]

Fry, Peter. 2013. Male homosexuality and spirit possession in Brazil. In *The Many Faces of Homosexuality*. New York: Routledge, pp. 146–62.

Gerymski, Rafał, and Wiktoria Magoń. 2023. Chemsex and Sexual Well-Being in Young Polish Men. *International Journal of Environmental Research and Public Health* 20: 6163. [CrossRef]

Gorczynski, Paul, and Fabio Fasoli. 2022. Loneliness in sexual minority and heterosexual individuals: A comparative meta-analysis. *Journal of Gay & Lesbian Mental Health* 26: 112–29. [CrossRef]

Graham, Eileen K., Emorie D. Beck, Kathryn Jackson, Tomiko Yoneda, Chloe McGhee, Lily Pieramici, Olivia E. Atherton, Jing Luo, Emily C. Willroth, Andew Steptoe, and et al. 2024. Do we become more lonely with age? A coordinated data analysis of nine longitudinal studies. *Psychological Science* 35: 579–96. [CrossRef]

Green, James N. 1999. *Beyond Carnival: Male Homosexuality in Twentieth-Century Brazil*. Chicago: University of Chicago Press.

Hawkley, Louise C., and John T. Cacioppo. 2010. Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine* 40: 218–27. [CrossRef]

Herrmann, Wolfram J., Philip Oeser, Pichit Buspavanich, Sonia Lech, Maximilian Berger, and Paul Gellert. 2023. Loneliness and depressive symptoms differ by sexual orientation and gender identity during physical distancing measures in response to the COVID-19 pandemic in Germany. *Applied Psychology: Health and Well-Being* 15: 80–96. [CrossRef]

Holt-Lunstad, Julianne. 2022. Social connection as a public health issue: The evidence and a systemic framework for prioritizing the "social" in social determinants of health. *Annual Review of Public Health* 43: 193–213. [CrossRef] [PubMed]

Hsu, Jing.-Hao, Poyao Huang, Chia-Wen Li, Adam Bourne, Carol Strong, and Stephane W.-W. Ku. 2024. Experiences of harm and mental ill-health among gay, bisexual and other men-who-have-sex-with-men who use methamphetamine or GHB/GBL in different combinations: Findings from the COMeT study in Taiwan. *Harm Reduction Journal* 21: 181. [CrossRef]

Huang, Yu-Te, Eddie S. K. Chong, Chi-Chung Lau, and Leo Z. Chow. 2024. Mentorship for young gay men in Hong Kong: A pilot mixed-methods randomized controlled trial. *American Journal of Community Psychology* 74: 110–26. [CrossRef]

Kuznier, Tatiane P., Flávia de Oliveira, Luciana R. F. Mata, and Tânia C. M. Chianca. 2016. Translation and cross-cultural adaptation of the UCLA Loneliness Scale (Version 3) for older adults in Brazil [Tradução e adaptação transcultural da UCLA Loneliness Scale (version 3) para idosos no Brasil]. *REME–Revista Mineira de Enfermagem* 20: e950. [CrossRef]

Lagojda, Lukasz, Deberson F. de Jesus, Daniel Kinnair, and Marc Chrysanthou. 2025. Mental health and drug use patterns among men who have sex with men (MSM) engaging in chemsex in the UK. *Healthcare* 13: 719. [CrossRef] [PubMed]

Lin, Po-Chun, Yu-Ping Chang, Yi-Lung Chen, and Cheng-Fang Yen. 2025. Mediating effect of loneliness on the associations of perceived and internalized sexual stigma with suicide in gay and bisexual men. *Journal of the Formosan Medical Association* 124: 825–29. [CrossRef] [PubMed]

Liu, Fangsong, and Zhengjia Ren. 2024. Internalized homonegativity and psychological distress among Chinese gay men: The mediating role of loneliness and the moderating role of authoritarian filial piety. *LGBT Health* 11: 156–63. [CrossRef] [PubMed]

Mata, Luciana R. F., Tatiane P. Kuznier, Aline C. Menezes, Cissa Azevedo, Fabrícia M. A. Amaral, and Tânia C. M. Chianca. 2022. Validity and reliability of the UCLA Loneliness Scale Version 3 among Brazilian older adults [Validade e confiabilidade da Escala de Solidão da UCLA versão 3 entre idosos brasileiros]. *Escola Anna Nery* 26: e20210087. [CrossRef]

Meyer, Ilan H. 1995. Minority Stress and Mental Health in Gay Men. *Journal of Health and Social Behavior* 36: 38–56. [CrossRef]

Meyer, Ilan H. 2003. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. *Psychological Bulletin* 129: 674–97. [CrossRef]

Oeser, Philip, Tristan Wellendorff, Hendrik Napierala, Marie Bolster, Paul Gellert, and Wolfram Herrmann. 2025. Social networks and loneliness differ between LGBTIA and cis-heterosexual persons: Results from a two-wave survey in Germany. *Scientific Reports* 15: 8061. [CrossRef]

Parker, Richard. 2014. *Beneath the Equator: Cultures of Desire, Male Homosexuality, and Emerging Gay Communities in Brazil*. New York: Routledge.

Pinazo-Hernandis, Sacramento, Jose M. Cerezo, and Celia Carrascosa. 2025. Loneliness and intersectional discrimination among aging LGBT people in Spain: A qualitative research study of gay men. *Behavioral Sciences* 15: 846. [CrossRef]

Platteau, Tom, C. Herrijgers, V. Barvaux, W. Vanden Berghe, L. Apers, and T. Vanbaelen. 2025. Chemsex and its impact on gay and bisexual men who have sex with men: Findings from an online survey in Belgium. *HIV Medicine* 26: 295–301. [CrossRef]

Polonijo, Andrea N., Annie L. Nguyen, Karah Y. Greene, Jasmine L. Lopez, Moka Yoo-Jeong, Erik L. Ruiz, Christopher Christensen, Jerome T. Galea, and Brandon Brown. 2024. Brief virtual intervention associated with increased social engagement and decreased negative affect among people aging with HIV. *AIDS Care* 36: 1102–10. [CrossRef]

Ratts, Alex. 2007. Entre personas e grupos homossexuais negros e afro-LGTTB. In *Homosexualidade sem Fronteiras*. Rio de Janeiro: Booklinks/Teresina.

Ross, Emily J., Daniel Jimenez, Delaram Ghanooni, Samantha Dilworth, Adam Carrico, and Renessa Williams. 2024. Relations between optimism-pessimism and loneliness in sexually minoritized men: The moderating role of chronicity-based discrimination. *Journal of Homosexuality* 72: 2613–32. [CrossRef]

Russell, Daniel W. 1996. UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment* 66: 20–40. [CrossRef] [PubMed]

Scofield, Ditte, Morten Frisch, Mikael Andersson, Merete Storgaard, Gitte Pedersen, Isik S. Johansen, Terese L. Katzenstein, Christian Graugaard, Lars H. Omland, Nina Weis, and et al. 2024. Psychosocial and sexual health among men with and without HIV who have sex with men: A cross-sectional nationwide study in Denmark. *HIV Medicine* 25: 1203–17. [CrossRef] [PubMed]

Skakoon-Sparling, Shayna, Paolo A. Palma, Adhm Zahran, Trevor A. Hart, David M. Moore, Joseph Cox, Nathan J. Lachowsky, Milada Dvorakova, Emerich Daroya, and Daniel Grace. 2023. Loneliness and the sexual behavior of sexual minority men in the context of the COVID-19 pandemic. *Social and Personality Psychology Compass* 17: e12814. [CrossRef]

Tabachnick, Barbara G., and Linda S. Fidell. 2019. *Using Multivariate Statistics*, 7th ed. London: Pearson.

Trombetta, Tommaso, Chiara Fusco, Luca Rollè, and Alessandra Santona. 2025. Untangling relational ties: How internalized homonegativity and adult attachment shape relationship quality in lesbian and gay couples. *Behavioral Sciences* 15: 205. [CrossRef]

van der Star, Arjan. 2024. The socioecology of sexual minority stigma: Advancing theory on stigma-based mechanisms underlying sexual orientation-based disparities in health. *Social Science & Medicine* 363: 117484. [CrossRef]

Weiss, Robert S. 1973. *Loneliness: The Experience of Emotional and Social Isolation*. Cambridge: MIT Press.

World Health Organization. 2025. *From Loneliness to Social Connection: Charting a Path to Healthier Societies: Report of the WHO Commission on Social Connection*. Geneva: World Health Organization. Available online: https://www.who.int/publications/i/item/978240112360 (accessed on 2 January 2026).

Wright, Talen, Francesca Solmi, Olesya Ajnakina, Elizabeth Ingram, Aaron Kandola, Stephen Lee, Eleonora Iob, Andrew Steptoe, Ben Thomas, and Gemma Lewis. 2024. The role of loneliness in the association between sexual orientation and depressive symptoms among older adults: A prospective cohort study. *Journal of Affective Disorders* 356: 137–44. [CrossRef]

Xie, Luyao, Phonnix K. H. Mo, Zixin Wang, Xiaobing Tian, and Joseph T. F. Lau. 2024. Men who have sex with men were more depressed than their counterparts because of lower social support and higher loneliness: A comparative survey among Chinese university students. *Journal of Affective Disorders* 353: 11–18. [CrossRef]