

# Prevalence of Dating App Usage in Gay, Bisexual, and Other Men Who Have Sex with Men (GBMSM)

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## Summary

**Fundaments:** Gay, bisexual and other men who have sex with men (GBMSM) are a vulnerable group to HIV and other sexually transmitted infections (STIs). A higher incidence of STIs and risky sexual practices has been linked to the widespread use of geosocial networking mobile applications for sexual and social encounters (GSN apps). The aim of this study was to determine the app usage prevalence among GBMSM users and their associated factors.

**Metodology:** Cross-sectional study in the city of Barcelona, Spain. Dating apps usage, sexual practice behaviors and sociodemographic information were collected from GBMSM patients in an STI clinic. The prevalence of apps usage to contact sexual partners was determined, comparing two groups according to use or non-use. Bivariate and multivariate analysis were carried out, presenting adjusted odds ratios (AOR) and 95% confidence intervals (CI).

**Results:** Prevalence of GSN apps usage among the 435 patients included was 66.4%. In multivariate analysis, GSN apps usage was significantly associated with younger age (AOR=0.96; CI=0.94-0.99); higher level of education (AOR=1.98; CI=1.22-3.20); having had 10 to 19 sexual partners (AOR=3.09; CI=1.46-6.54), or more than 20 (AOR=4.66; CI=2.20-9.89); occasional use or non-use of condoms (AOR=2.04; CI=1.07-3.88) and use of methamphetamine, mephedrone, GHB/GBL or ketamine for sex (chemsex; AOR=1.88; CI=1.04-3.40) during the last year.

**Conclusions:** The use of dating apps was significantly related to younger GBMSM, with university studies, a high number of sexual partners, less use of condoms, and chemsex practice. It is necessary to explore new ways of accessing this population with the previous mentioned higher risk factors for VIH and STI acquisition.

## Key words:

Sexual health promotion. HIV. GBMSM. Queer health. GSN apps. Sexual behaviors.

## Prevalencia del uso de apps para citas en hombres gays, bisexuales y otros hombres que tienen sexo con hombres (GBHSH)

### Resumen

**Fundamentos:** Gais, bisexuales y otros hombres que tienen sexo con hombres (GBHSH) son un grupo vulnerable a infección por VIH y otras infecciones de transmisión sexual (ITS). Una mayor incidencia de ITS y prácticas sexuales de riesgo se han asociado a un extendido uso de aplicaciones móviles que usan la geolocalización para encuentros sexuales y sociales (apps GSN). El objetivo del estudio fue determinar la prevalencia del uso de estas apps entre usuarios GBHSH y sus factores asociados.

**Metodología:** Estudio transversal en la ciudad de Barcelona, España. Se incluyó información sociodemográfica, sobre uso de apps GSN y conductas en relación al sexo de pacientes GBHSH de una clínica de ITS. Se determinó la prevalencia de uso de apps GSN. Se compararon grupos según uso o no uso de éstas a través de análisis bivariado y multivariado, presentando odds ratios ajustados (ORa) e intervalos de confianza del 95% (IC).

**Resultados:** La prevalencia de uso de apps GSN fue de 66,4%. El análisis multivariado asoció su uso a menor edad (ORa=0,96; IC=0,94-0,99), mayor nivel de estudios (ORa=1,98; IC=1,22-3,20), haber tenido 10 a 19 (ORa=3,09; IC=1,46-6,54), o 20 y más (ORa=4,66; IC=2,20-9,89) parejas sexuales, uso inconsistente del preservativo (ORa=2,04; IC=1,07-3,88) y práctica del chemsex (ORa= 1,88; IC=1,04-3,40).

**Conclusiones:** El uso de apps para citas se relacionó significativamente a GBHSH más jóvenes, con estudios universitarios, elevado número de parejas sexuales, menor uso de preservativo y que practica chemsex. Se hace necesario explorar nuevas formas de acceder a esta población con estos mayores factores de riesgo de adquisición de VIH y otras ITS.

## Palabras clave:

Promoción de la salud sexual. VIH. GBHSH. Salud queer. Apps GSN. Conductas sexuales.

## Introduction

The collective of gay, bisexuals and other men who have sex with men (GBMSM) presents an historical and persistent higher incidence of cases of HIV and other STIs<sup>1-4</sup>. In the last decade, the generalization of the use of mobile applications to facilitate sexual and social encounters (GSN for Geosocial networking apps), has impacted on the affective dynamics of various populations<sup>5-7</sup>. Although in this group its usage has been associated with an increase in STI diagnoses and risk practices for HIV and STI, such as a greater number of sexual partners, anal penetration without a condom or drugs use for sexual practice<sup>7-10</sup>.

There's different opinions about the relationship between the use of GSN apps and the presence of the risk factors mentioned above; wondering if the use of these is a confusing variable to the intention of not using condom, within a group that widely accesses these platforms<sup>11</sup>. On the one hand, the association between the GBMSM group and STI risk practices predates the usage of GSN apps, and responds to dynamics of socialization and community generation outside the normative social sphere. Those dynamics include encounters in public places (cruising), gay saunas or bars, in addition to emerging technologies such as advertisements in newspapers, phone lines or forum rooms at the beginning of the internet age<sup>12</sup>. Many times these forms of relations are the only possible option for interaction in contexts of discrimination and stigma<sup>4,6,9</sup>.

However, the ability to negotiate and carry out fleeting encounters in a short time, the high volume of users, or the freedom feeling existent on virtual platforms, such as showing a predilection for practices that are not socially accepted, could increase the risk to which users are exposed, especially young GBMSM who initiate interactions on these platforms<sup>9,13</sup>. Elements such as the greater availability for getting access to sex parties or drug sales, have evidenced an increase in sexualized drug consumption practices (chemsex) and their consequences, such as the effects of the problematic use of drugs such as methamphetamine and mephedrone, as well as the risks associated with intoxication by GHB/GBL<sup>14-16</sup>.

The reasons for apps usage are varied, and they do not always respond to an active search for sexual encounters<sup>17,18</sup>. In the same way, differences between the applications can result in completely different populations, finding subpopulations where the risk can be even greater, affecting the response level and effectiveness of interventions carried out within these platforms<sup>18-20</sup>.

The aim of this study was to determine the prevalence of use of "geosocial networking apps" for sexual and social encounters, in people identified as GBMSM in Barcelona, Spain, and factors related to its use.

## Material and method

### Design

Cross-sectional study nested in a cohort who aimed to determine syphilis incidence between contacts of infected persons, carried out in the city of Barcelona, Spain, during year 2015 in a specialized STI clinic (Drassanes).

### Study population

The recruited participants were patients who presented syphilis symptoms and their contacts, who attended to the STI clinic between January and October 2015, 62.3% of them presented syphilis. During the visit, they were asked to participate in the study. Those interested and who signed the informed consent were included, receiving periodic controls in one year of follow-up. People under 18 years of age and those whose index case occurred more than three months before the visit were excluded.

The information was obtained directly by the clinic professional by computer, collecting sociodemographic variables, health history, and sexual behavior. All data were anonymized.

For selection of GBMSM patients, we used the variables "gender" and "sexual orientation" and selected male patients who answered "homosexual" and "bisexual".

### Analysis variables

Sociodemographic variables were collected: Age, gender, sexual orientation, country of born, employment status and educational level (none, primary, secondary or higher). Health variables were: previous HIV and other sexually transmitted infections diagnosis in life. Behavioral variables were all reported for last 12 months: condom usage for penetrative sex (always, frequently, occasionally, never), occasional sex partners number (no distinction for gender), and performing sex work. Chemsex was defined as the use of any of the following drugs before or during sexual practices: GHB/GBL, ketamine, methamphetamine, or mephedrone. In addition to performing a separate analysis for other drugs. Serosorting was defined as the selection of sexual partners according to their HIV status, and seroadaptation according to the question "Do you change your sexual practice to passive or active according to the serological status of your partner?".

As a dependent variable, the question "contact mode of sexual partners in the last 12 months" was divided between those who reported using GSN apps ("mobile application") versus those who described other forms of contact (internet, cruising, sex clubs, cinemas, saunas, bars and discos, friends or acquaintances).

## Statistical analysis

A descriptive analysis was carried out, presenting proportions for the categorical variables and medians with interquartile range (IQR) for the numerical ones. A bivariate analysis was also performed to compare the groups that used apps and those that did not, through Pearson's Chi square for categorical variables and U Mann-Whitney test for age variable, that had not normal distribution.

Finally, to identify variables associated with the use of the apps, a multivariate logistic regression model was performed, using the method of all possible equations. Adjusted OR (AOR) and 95% confidence intervals (95% CI) were calculated. The statistical package STATA-15® was used for the analysis.

## Ethical considerations

The study was approved by the Hospital Vall d'Hebron Ethics Committee (PR(AG)297/2014). The participants signed the informed consent before participating. The information was processed following data storage procedures according to the Organic Law 3/2018, of December 5th, on the Protection of Personal Data and Guarantee of Digital Rights.

## Results

Table 1 shows main characteristics of the study population. The median age of the 435 participants was 36 years (IQR: 30-44), highlighting 66.4% reported use of apps for sex-social contacts, 66.7% of participants with university studies, 40.0% foreign-born, 38.2% HIV prevalence, 62.1% history of bacterial STIs. In addition, 42.9% reported 10 or more sexual partners in the last 12 months, 30.3% used a condom in all their sexual relations in the last 12 months and 33.8% reported chemsex practice during the last 12 months. Other ways used for sexual contacts were sex clubs (18.9%), public places or cruising (15.9%), Internet sites (37.7%), saunas (18.6%), and bars or clubs (39.8%). The mostly used substances before or during sex were Popper (34.0%), alcohol (27.1%), cannabis (24.8%) and GHB / GBL (23.2%).

In the bivariate analysis between use and not use of GSN apps (Table 1), it was significantly observed a lower age in app users (35.9 vs 38.0 years;  $p=0.038$ ) and a higher quantity of sexual partners (having 10 to 19 partners: 15.2% vs 11.2% and 20 or more partners: 23.9% vs 10.4%;  $p < 0.001$ ). Also presented occasional or never condom usage (28.4% vs 17.2%;  $p=0.063$ ); serosorting practices (17.0% vs 7.5%;  $p=0.008$ ); sero-adaptation (11.8% vs 5.2%;  $p=0.007$ ); practicing sex work (6.9% vs 3.7%;  $p < 0.001$ ); and chemsex (31.5% vs 14.9%;  $p=0.001$ ) during the last 12 months.

Differences in country of birth, educational level, STI and HIV history were not significant. Furthermore, it was possible to identify a significantly higher use of all drugs among app users, of which the most used was Poppers (39.1% vs 24.6%;  $p=0.009$ ) (Figure 1).

At multivariate level (Table 2), apps usage was associated with lower age (AOR=0.96; CI=0.94-0.99); higher level of education (AOR=1.98; CI=1.22-3.20); having had 10 to 19 (AOR=3.09; CI=1.46-6.54); or 20 and more (AOR=4.66; CI=2.20-9.89) sexual couples; occasional or non-condom use (AOR=2.04; CI=1.07-3.88) and chemsex practice (AOR=1.88; CI=1.04-3.40) in the last 12 months.

## Discussion

This study compared for the first time differences in risk practices between app users versus other ways for contacting sexual partners in Barcelona. App users had a significantly higher number of sexual partners, less condom usage and more chemsex practice than those who did not use GSN apps. Although it cannot be affirmed that these associations are causal, these platforms concentrate a population that presents a higher frequency of risk practices.

Among the characteristics of participants, there was a high prevalence of users with previous HIV and STIs history, higher than the data registered in the general population<sup>21</sup>. This could be related to the STI center's own characteristics, such as its efficiency in STI management and the trust of users. These could present a greater sensitivity to regular testing, which could underestimate any association. The high number of foreign-born people could be an over estimation element, as an increased risk of HIV described in migrant GBMSM<sup>22,23</sup>. On the other hand, similar sociodemographic characteristics has been found in national GBMSM population<sup>24</sup>.

The usage of GSN apps was associated with being younger and with a higher level of education, which is consistent with the literature<sup>18</sup>. The use of apps for casual encounters has also been described in non-GBMSM university students, proposing a secondary relationship to the fact that the penetrance of mobile technologies is higher in the younger population<sup>5,25</sup>. GSN app users were also associated with higher educational level, which could be explained by better adaptation to new technologies<sup>5</sup>. In this study, a consistently lower condom usage was observed among app users, which is consistent with other studies globally<sup>5,26</sup>. However, no differences were found in the prevalence of HIV/STI between both groups, a relationship that has been described in some studies, but has not been replicated in systematic reviews<sup>5,27</sup>.

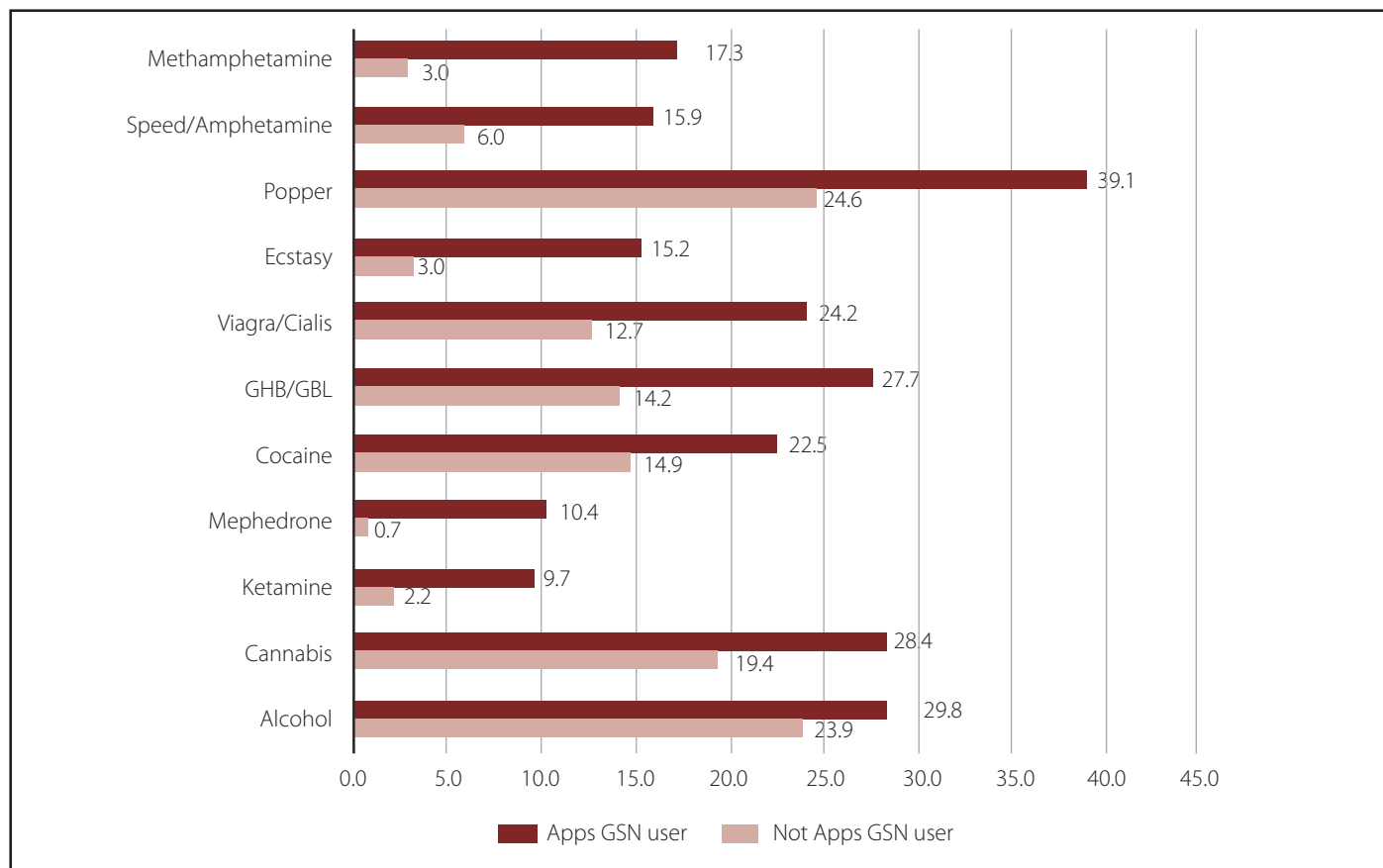
**Table 1. Participants' characteristics and bivariate analysis according to GSN apps usage for social sexual encounters in GBMSM. Barcelona, Spain 2015.**

	Total		Do not use GSN apps		Use GSN apps		p*
	N	%	N	%	N	%	
Age (median)	435	36.3	134	38	289	35.9	0.038
Country of birth							
Spain	259	59.5	74	55.2	179	61.9	0.336
Foreign	176	40.5	60	44.8	110	38.1	
Educational level							
Primary	19	4.4	6	4.5	12	4.2	0.147
Secondary	123	28.3	49	36.6	71	24.6	
Higher	290	66.7	77	57.5	205	70.9	
DK/DA	3	0.7	2	1.5	1	0.3	
Bacterial STI during life							
Yes	270	62.1	85	63.4	179	61.9	0.839
No	137	31.5	39	29.1	93	32.2	
DK/DA	28	6.4	10	7.5	17	5.9	
HIV history							
Yes	166	38.2	47	35.1	117	40.5	0.273
No	255	58.6	81	60.4	165	57.1	
DK/DA	14	3.2	6	4.5	7	2.4	
Anal penetration with occasional partners							
Yes	371	85.3	106	79.1	262	90.7	<0.001
No	44	10.1	22	16.4	16	5.5	
DK/DA	20	4.6	6	4.5	11	3.8	
Number of occasional sex partners last 12 months							
01-04	116	26.7	53	39.6	55	19	<0.001
05-09	43	9.9	16	11.9	27	9.3	
10-19	59	13.6	15	11.2	44	15.2	
20 or more	84	19.3	14	10.4	69	23.9	
DK/DA	133	30.6	36	26.9	94	32.5	
Condom use for anal sex last 12 months							
Occasionally/never	108	24.8	23	17.2	82	28.4	0.063
Frequently	179	41.1	53	39.6	122	42.2	
Always	132	30.3	50	37.3	77	26.6	
DK/DA	16	3.7	8	6	8	2.8	
Serosorting last 12 months							
Yes	59	13.6	10	7.5	49	17	0.008
No	256	58.9	83	61.9	168	58.1	
DK/DA	120	27.6	41	30.6	72	24.9	
Seroadaptation last 12 months							
Yes	41	9.4	7	5.2	34	11.8	0.007
No	256	58.9	77	57.5	175	60.6	
DK/DA	138	31.7	50	37.3	80	27.7	
Sex Work last 12 months							
Yes	26	6	5	3.7	20	6.9	<0.001
No	357	82.1	109	81.3	243	84.1	
DK/DA	52	12	20	14.9	26	9	
Chemsex last 12 months <sup>a</sup>							
Yes	113	26	20	14.9	91	31.5	0.001
No	317	72.9	114	85.1	195	67.5	
DK/DA	5	1.1	0	0	3	1	
Drug use for sex last 12 months <sup>b</sup>							
Yes	233	53.6	60	44.8	170	58.8	<0.001
No	197	45.3	74	55.2	116	40.1	
DK/DA	5	1.1	0	0	3	1	

\*Chi-square test for categorical variables and U Mann-Whitney test for numerical.

<sup>a</sup>Use of Methamphetamine, GBL/GHB or Mephedrone before or during sex.<sup>b</sup>Use of any drug before or during sex.

DK/DA: Do not know/ Do not answer.

**Figure 1. Drug use for sex during last 12 months according to usage of apps for social sex encounters in GBMSM (N=435). Barcelona, Spain 2015.**

P value <0.001 in all variables.

**Table 2. Factors associated to apps usage for social sex encounters in GBMSM (N=435). Multivariate analysis. Barcelona, Spain 2015.**

	AOR*	CI 95%	p
Age	0.96	0.94 - 0.99	0.005
Educational level			
Secondary or less	1		
Higher	1.98	1.22 - 3.20	0.005
DK/DA	0.99	0.08 - 12.38	0.992
Number of occasional sex partners in the last 12 months			
1-4	1		
5-9	1.98	0.92 - 4.29	0.083
10-19	3.09	1.46 - 6.54	0.003
20 or more	4.66	2.20 - 9.89	<0.001
DK/DA	2.46	1.35 - 4.45	0.003
Condom use for anal sex			
Always	1		
Frequently	1.29	0.77 - 2.16	0.335
Occasionally/never	2.04	1.07 - 3.88	0.029
Chemsex <sup>‡</sup>			
No	1.00		
Yes	1.88	1.04 - 3.40	0.038

\*OR adjusted for age, educational level, number of sexual partners, condom usage, and Chemsex practice.

<sup>‡</sup>Use of Methamphetamine, GBL / GHB or Mephedrone before or during sex.

DK/DA: Do not know/ Do not answer.

The highest number of sexual partners described in this study is consistent with previous evidence<sup>5</sup>. Among the reasons for this difference, Choi *et al*, proposed theories of the ability to concretize immediate and very close encounters<sup>9,28</sup>. The city of Barcelona is a common destination for GBMSM migration and tourism, increasing the offer of users on the apps<sup>29</sup>. Similarly, features of the GSN app, such as the ability to update nearby users based on GPS position, and notifications about profile visits and messages, could increase the integration of gambling behaviors in sexual practices<sup>30,31</sup>.

In the present study, it was observed that app users have a significantly higher consumption of drugs, being those specific for chemsex practice of special interest. The association between chemsex and the apps usage is widely described in recent studies, however the association between GBMSM and the problematic use of alcohol and recreational drugs predates the appearance of these<sup>8,10,32</sup>. Furthermore, these platforms can facilitate the ability to instantly and closely access to drugs or sex parties, significantly impacting the increase in chemsex<sup>14,18</sup>. For this reason, it is plausible that the causality is inverse and it is more likely that users who seek for chemsex practices or sex parties, use these platforms to facilitate encounters more quickly, thus supporting the gratification found on the apps<sup>9</sup>. Although not all users seek to acquire drugs as the objective of using these platforms, the high supply can normalize the cultural perception of consumption, especially in young GBMSM<sup>18</sup>. In addition, it is likely that the same user may present different practices within the app after having consumed alcohol or drugs, increasing their exposure to higher risk situations<sup>33</sup>.

In bivariate analysis, a higher prevalence of serosorting, sero-adaptation, and sex work practices were observed among app users. In general, serosorting practices can be effective in monogamous couples who carry out a periodic examination or where both parties have a knowledge of their serological status, but a risk can be presented in front of occasional couples, in contexts of immediacy or furtiveness of relationships, especially if they occur under the influence of alcohol or drugs<sup>34</sup>. Therefore, it may be important to discuss it during sexual counseling, or to be considered for the development of new preventive strategies through these platforms, combined with strategies that include knowledge and access to Pre-Exposure (PrEP) and Post-Exposure Prophylaxis (PEP). In relation to sex work, these platforms grant greater freedom, security and independence to those who carry out this activity<sup>35</sup>.

Among the limitations of this study, the population was recruited in a STI clinic setting, so there may be a selection bias, although we consider that it is better than online recruitment for the purpose of this article, because the need of having indivi-

duals who do not use GSN apps. It could be made a comparison with the Spanish population in the largest EMIS questionnaire, where GBMSM population reported similar sociodemographic characteristics, but slightly younger (median age 33,1 years) and very lower prevalence of previous STI<sup>24</sup>. Additionally, people who access health services tend to have better health indicators and greater self-care practices, which may not represent vulnerable populations that do not access these services as the general GBMSM population<sup>36</sup>. Access to GSN apps requires a Smartphone and the use of mobile data, which can result in economic inequality compared to other forms of contact, however, the massification of mobile technologies at affordable prices suggests that this inequality may have actually decreased<sup>37</sup>.

Among the strengths of this study, the scarcity of previous research that compares the differences between those who use GSN apps and those who use other ways to flirt in Spain stands out. The GSN apps are one more tool, within the multiple options, to access sexual and social contacts, both for GBMSM people and for the general population. They have a positive impact in territories where the public expression of sexual orientation can have consequences for the integrity of its users, in addition to facilitating the expression of serological status in HIV-positive people<sup>38</sup>. GSN apps are often GBMSM youth's first contact with peers and associated culture<sup>18</sup>. Its use for the dissemination of preventive messages has proven to be very effective, making it a very positive tool for future interventions in sexual health<sup>39</sup>. Maintaining ethical considerations around the usage of digital data, and remembering the importance of understanding the variability of platforms according to the context and territory where the intervention is planned to be carried out<sup>40-42</sup>.

## Conclusions

This study relates the use of apps for sexual and social contacts (GSN apps) to younger GBMSM; with university studies; high number of sexual partners; less use of condoms; and who practice chemsex. Considering this, a higher risk population can be identified.

The role of health professionals and groups related to prevention who assist users of these apps should be the early search for vulnerabilities and linkage to health systems, generating spaces for reducing risk that allow safe practices to be carried out. Therefore, it is necessary to explore different ways to access this population.

## Conflict of interest

No competing financial interests exist.

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