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**HIV VULNERABILITY OF MEN WHO HAVE SEX WITH MEN USERS OF
GEOSOCIAL DATING APPLICATIONS**

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DEDICATION

I dedicate this work to someone who was essential to make it come true: Alvaro, without his support, dedication and inspiration I know I would not have succeeded. Thank you.

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EPIGRAPH

"We look out into space for an answer, but just find spheres orbiting spheres. We look inside ourselves for an answer, but just find spheres orbiting spheres."

Darwin Watterson III

ABSTRACT

Queiroz, Artur Acelino Francisco Luz Nunes Queiroz. **HIV vulnerability of men who have sex with men users of geosocial dating applications**. 2017. 70 f. Dissertation (Masters in Sciences) - School of Nursing of Ribeirão Preto, University of São Paulo, Ribeirão Preto, 2017.

Men who have sex with men (MSM) are a population disproportionately more afflicted by HIV infection. The high prevalence of infection among this population evidences the need to follow new behaviors, in which the use of mobile social networks is emphasized to accelerate the occasional sexual act. Thus, our study aimed to analyze the vulnerabilities of men who have sex with men, users of geosocial applications against HIV infection. For this, two sequential steps were performed: 1st - Integrative literature review and 2nd - Descriptive and exploratory study. The research obeyed the ethical guidelines on research with human beings, regulated by resolution 466/12 and approved by the Committee of Ethics and Research of the School of Nursing of Ribeirão Preto/USP (1.921.265/2017). The review was guided by the question: does using geosocial dating applications to find sexual partners increase the risk behavior for HIV infection by MSM? We searched the databases PubMed, Web of Science, CINAHL and LILACS, considering primary studies published until December 2015, without time restrictions. The synthesized knowledge guided the structuring and interpretation of the next step. The exploratory study aimed to evaluate the knowledge of men who have sex with men using geolocation-based dating software, about HIV/aids and implications for establishing partnerships. Interviews were conducted with 30 Hornet® users recruited in the application using the Time-Location Sampling (TLS) technique. The statements generated had statistical treatment in the IRaMuTeQ software, later analyzed by the Descending Hierarchical Classification. The data collection was provided by the modified TLS virtual reality. The Computer-Assisted Interview (CASI) technique was used for data collection. The collection was performed by two properly trained researchers, who registered in the application to have access to the users and created a public profile. The first online users, who recorded the current HIV/aids serological status in their profile, were discussed. Application users have insufficient knowledge about HIV/aids prevention measures, especially when discarding the male condom. Sex with partners found through applications was characterized as casual, immediate, unprotected, associated with drug use, and without information about partners' HIV status. The relationships established by the applications reveal new patterns of behavior and relationships, placing MSM in situations of high risk of HIV infection and different forms of protection, which may occur simultaneously.

Descriptors: Sexual behavior/psychology; Homosexuality, male; HIV infections.

RESUMO

Queiroz, Artur Acelino Francisco Luz Nunes Queiroz. **Vulnerabilidade ao HIV de homens que fazem sexo com homens usuários de aplicativos geossociais para encontros**. 2017. 70 f. Dissertação (Mestrado em Ciências) – Escola de Enfermagem de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, 2017.

Homens que fazem sexo com homens (HSH) são uma população desproporcionalmente mais afligidos pela infecção do HIV. A alta prevalência da infecção entre essa população, evidencia a necessidade de acompanhar novos comportamentos, no qual se destaca o uso das redes sociais móveis para agilizar o ato sexual ocasional. Assim, nosso estudo teve como objetivo analisar as vulnerabilidades de homens que fazem sexo com homens, usuários de aplicativos geossociais de encontro, à infecção por HIV. Para isso foram realizadas duas etapas sequenciais: 1^a - Revisão integrativa da literatura e 2^a - Estudo descritivo e exploratório. A pesquisa obedeceu as diretrizes éticas sobre pesquisas com seres humanos, reguladas pela resolução 466/12 e aprovado pelo Comitê de Ética e Pesquisa da Escola de Enfermagem de Ribeirão Preto /USP (1.921.265/2017). A revisão foi guiada pela questão: o uso de aplicativos de geossociais de encontro para encontrar parceiros sexuais aumenta o comportamento de risco para a infecção pelo HIV por HSH? Pesquisamos as bases de dados PubMed, Web of Science, CINAHL e LILACS, considerando estudos primários publicados até dezembro de 2015, sem restrições de tempo. O conhecimento sintetizado guiou a estruturação e interpretação da próxima etapa. O estudo exploratório objetivou avaliar o conhecimento de homens que fazem sexo com homens usuários de aplicativo de encontro baseado em geolocalização, sobre o HIV/aids e implicações no estabelecimento de parcerias. Realizou-se entrevistas com 30 usuários do Hornet® recrutados no aplicativo pela técnica *Time-Location Sampling* (TLS). Os depoimentos gerados tiveram tratamento estatístico no software IRaMuTeQ, posteriormente analisados pela Classificação Hierárquica Descendente. A coleta de dados foi propiciada pela TLS modificada a realidade virtual. Na coleta de dados utilizou-se a técnica *Computer-Assisted Interview* (CASI). A coleta foi realizada por dois pesquisadores devidamente treinados, que se registraram no aplicativo para ter acesso aos usuários e criaram um perfil público. Foram abordados os primeiros usuários *online*, que registraram em seu perfil o status sorológico atual para o HIV/aids. Usuários de aplicativos possuem conhecimento insuficiente sobre medidas de prevenção do HIV/aids, principalmente quando se descarta o preservativo masculino. O sexo com os parceiros encontrados por meio de aplicativos foi caracterizado como ocasional, imediato, desprotegido, associado ao uso de drogas e sem informações sobre o status de HIV dos parceiros. As relações estabelecidas pelos aplicativos revelam novos padrões de comportamento e relacionamento, colocando HSH frente a situações com alto risco de infecção pelo HIV e diferentes formas de proteção, que podem ocorrer simultaneamente.

Descritores: Comportamento sexual/psicologia; Homossexualidade masculina; Infecções por HIV.

RESUMEN

Queiroz, Artur Luz Acelino Francisco Nunes Queiroz. **Vulnerabilidad al VIH de hombres que tienen sexo con hombres usuarios de aplicaciones geosociales para encuentros.** 2017. 70 f. Disertación (Maestría en Ciencias) - Escuela de Enfermería de Ribeirão Preto, Universidad de São Paulo, Ribeirão Preto, 2017.

Los hombres que tienen sexo con hombres (HSH) son una población desproporcionadamente más afectada por la infección por el VIH. La alta prevalencia en esta población evidencia la necesidad de explorar los comportamientos sexuales, debido al uso de redes sociales móviles que pueden provocar un incremento de la actividad sexual ocasional. Por lo tanto, nuestro estudio tuvo como objetivo analizar la vulnerabilidad de hombres que tienen relaciones sexuales con hombres, usuarios de aplicaciones geosociales contra la infección por el VIH. Para ello, se realizaron dos pasos secuenciales: 1° - Revisión integrativa de la literatura y 2° - Estudio descriptivo y exploratorio. La investigación obedeció a las directrices éticas sobre investigación con seres humanos, reguladas por la resolución 466/12 y aprobadas por el Comité de Ética e Investigación de la Escuela de Enfermería de Ribeirão Preto/USP (1.921.265 / 2017). La revisión se guió por la pregunta: ¿el uso de las citas geosociales para encontrar compañeros sexuales aumenta el comportamiento de riesgo de la infección por el VIH por HSH? Las bases de datos utilizadas fueron PubMed, Web of Science, CINAHL y LILACS. Fueron seleccionados estudios primarios, publicados hasta diciembre de 2015 y sin restricciones de tiempo. El conocimiento sintetizado guió la estructuración e interpretación del siguiente paso. El estudio exploratorio tuvo como objetivo evaluar el conocimiento de los hombres que tienen relaciones sexuales con hombres utilizando un software de citas basado en la geolocalización, sobre el VIH / SIDA y las implicaciones para establecer relaciones. Fueron realizadas 30 entrevistas con usuarios reclutados en la aplicación de Hornet®, y utilizando la técnica de muestreo de tiempo (TLS). Las declaraciones generadas tuvieron tratamiento estadístico en el software IRaMuTeQ y posteriormente analizado por la Clasificación Jerárquica Descendente. La recopilación de datos fue proporcionada por la realidad virtual TLS modificada. La técnica de la entrevista asistida por computadora (CASI) se utilizó para la recopilación de datos. La recolección fue realizada por dos investigadores debidamente capacitados, quienes se registraron en la aplicación para tener acceso a los usuarios y crearon un perfil público. Fueron abordados los primeros usuarios *online* que registraron el estado serológico actual del VIH/SIDA en su perfil. Los usuarios de aplicaciones tienen un conocimiento insuficiente sobre las medidas de prevención del VIH/SIDA, a excepción del preservativo masculino. El sexo con las parejas encontradas a través de las solicitudes se caracterizó como casual, inmediato, sin protección, asociado con el uso de drogas y sin información sobre el estatus VIH de los compañeros. Las relaciones establecidas por las solicitudes revelan nuevos patrones de comportamiento y relaciones, colocando a los HSH en situaciones de alto riesgo de infección por VIH y diferentes formas de protección, que pueden ocurrir simultáneamente.

Descriptor: Conducta sexual/psicología; Homosexualidad masculina; Infecciones por el VIH.

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List of abbreviations and acronyms

APPS	Applications
CASI	Computer Assisted Interview
HIV	Human Immunodeficiency Virus
LGBTB+	Lesbian, Gay, Bisexuals, Transvestis, Transexuals and Transgenders
MSM	Men who have sex with men
NHC	National Health Council
FICF	Free and Informed Consent Form
TLS	Time Location Sampling

SUMMARY

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1 INTRODUCTION

The challenge of global health is a problem of high magnitude in the world panorama, with trends and patterns that are variable. Few events in the last decades have affected health as the advent of Human Immunodeficiency Virus (HIV)/aids infection, since this phenomenon has global proportions, proving to be dynamic and unstable, closely related to factors such as individual and collective behavior and temporal trends (FERNANDES et al, 2016).

Because it is a pandemic, the HIV infection is not limited by geopolitical barriers, and presents epidemiological characteristics and patterns that vary according to social stimuli and the various geographic regions. Understanding these differences and specificities contributes to the global surveillance of the epidemic and to the implementation of more effective interventions (KAGOTHO; SSEWAMALA, 2012; KAMAT et al, 2013).

Despite the heterogeneity of cases observed in the world population, more recent studies indicate groups of vulnerability within this global epidemic, which include men who have sex with men (MSM), who have a higher HIV prevalence than in the general population and among other vulnerable populations (previously known as "key groups") for the infection (BEYRER, et al 2012; MALAVÉ, 2014; UNAIDS, 2012).

One of the peculiarities of HIV infection is the fact that its infectious agent is transmitted and prevented by a common factor: sexual behavior. Behaviors that have a potential exposure to the risk of HIV infection presented by individuals, arise from an assessment and risk management, which can be translate into protective or risk behaviors (NODIN, CARBALLO-DIÉGUEZ; LEAL, 2015).

Faced with these behaviors that can put these individuals in a situation of vulnerability to HIV, there is now a tool with potential to increase the incidence of this infection: the use of mobile social networks for friendships, encounters and relationships. Studies of users of these applications (Apps), available for mobile devices made it possible to describe high rates of sexual partners and unprotected anal sex without the adoption of necessary preventive strategies (LANDOVITZ, et al 2013, BOONE; COOK; WILSON, 2013).

Other researchers also point to high adherence to applications by MSM, especially the younger (> 20 years). The casual sex made possible with the aid of these social media is, almost always, rapid, unscheduled, circumstantial, and at an early age. Most of the time the

condom is dispensed with and there is high turnover of partners, since these relationships are casual and with possibilities of sexual practices in group (BOONE; COOK; WILSON, 2013, BARAL et al, 2015; BEYRER et al, 2013; MUESSIG et al, 2013). Given the above, was elected as the object of study of this research, the vulnerabilities to HIV infection of men who have sex with men, geosocials application users.

1.1 LITERATURE REVIEW

1.1.1 HIV: epidemiology and global impact

The earliest descriptions of aids emerged in 1980 after analyzing cases of pneumonia diagnosed in healthy young gay men. In view of the analysis of these cases by Francoise Barre-Sinoussi and Luc Montagnier, it was possible to isolate and identify HIV in 1983. This process allowed its identification as a retrovirus and its name as "human immunodeficiency virus" (BRUŚ-CHOJNICKA et al, 2014).

After its discovery and understanding of its infectious character, its spread around the world has become a constant, rapidly consolidating as a leading cause of death among young people, injecting drug users and men who have sex with men (ALARCÓN et al, 2012; BEYRER et al, 2012).

Although its transmission is limited to contact with specific fluids (blood, sexual secretions), HIV infection has transmission and death rates comparable to those of major respiratory transmission pandemics such as the Black Death and the Spanish Flu (UNAIDS, 2012).

Like these pandemics, HIV has been a huge challenge for humanity as a whole, causing fear, for presenting itself as an incurable disease so far, and being seen as deadly; Challenging science, which had limited technological resources for the treatment of retroviruses and altering even the most intimate behavior patterns; Attributing new meanings to human sexuality, surrounding themselves with risks and taboos (MALAVÉ et al, 2014).

Due to its impact on areas of common interest (health, safety, sexuality and economics), discussions on HIV/aids are strongly present in the academic community and in society as a whole (GOMES; SILVA; OLIVEIRA, 2011). As it is a pandemic, the virus infection is not limited by geopolitical barriers, and presents characteristics and epidemiological patterns that vary according to the region (KAGOTHO; SSEWAMALA, 2012; KAMAT, 2013). Understanding these differences and specificities contributes to the global surveillance of the epidemic, as well as to the creation of more specific and effective interventions.

Since its discovery, it is well known that Africa, Asia and Eastern Europe have the highest rates of infection per inhabitant. However, in the last decade, several epidemics have changed: in 39 countries, the incidence of HIV infection among adults fell by more than 25% between 2001 and 2011; of these, 23 countries are in sub-Saharan Africa. The infection,

formerly seen as the "Gay Pest", now reaches almost the entire population (with an ascendancy in women, elderly, heterosexual men and injecting drug users), and is considered by some authors as a chronic-transmissible disease (TAWIL, 2013).

Latin America is the third most affected region in the world for HIV infection, behind only Africa and Asia. In this region, population estimates show that HIV infection is prevalent in 1.0% of the population, with aids being a major cause of death among children. Such rates are the largest found outside sub-Saharan Africa. However, the epidemic is not homogeneous throughout Latin America. Its calculation of prevalence in the general population is based on an average of the countries that compose it, which makes the evaluation of this aggravation even more complex and multifaceted (BARRETO et al, 2012; GARCÍA; BAYER; CÁRCAMO, 2014; TEVA et al, 2012; SHEEHAN et al, 2015).

In Brazil, 48,000 new HIV cases were recorded, with 14,000 infection-related deaths in the last year (UNAIDS, 2017). Even with these indexes, the epidemic is stable in the country, high and worrisome in certain vulnerable populations: men who have sex with men, drug users and female sex workers are groups with higher prevalence rates than the population in general.

1.1.2 Men who have sex with men and their interface with new technologies

Men who have sex with men represent one of the most vulnerable populations to HIV, globally these men accounted for 12% of new infections by 2015, while sex workers and injection drug users accounted for 5% and 8% of new infections, respectively. In Brazil, those men are one of the major population afflicted by the infection (with a proportion of 3,5% of the population), but still widely neglected by society and scientific community (UNAIDS, 2017).

The high prevalence rate among this population shows the need to follow the new behaviors and tendencies presented by the group. It is within this presented scenario, in which HIV/aids is a challenge to the world health system, with great possibilities of infection and rapid spread, which stands out nowadays an aggravating factor with potential to increase infection rates: the use of social networks to streamline the occasional sex without the proper adoption of necessary preventive strategies (LANDOVITZ et al, 2013).

The aggravating factor of the described virtual scenario is the possibility of providing individuals with an "exit" to be "themselves", without exposing the truth about their sexual preferences and behaviors, caused by negative attitudes about their homosexual practices that

can lead to rejection by friends and family, discriminatory acts and intimidation, sometimes even violence (KRAKOWER et al, 2012; LANE et al, 2011).

Thus, some MSM choose to hide their behavior to protect themselves from homophobia, stigma and discrimination. This can be stressful, limit social support, and negatively affect health (OLIVEIRA et al, 2017; ALTMAN et al, 2012).

The literature points to several reasons for the popularity of the Internet as a tool for the search for sex among MSM. One of the reasons is that the Internet provides these men an effective and convenient subsidy to quickly locate sexual partners compared to other traditional and offline ways. The Internet also allows men to filter potential partners according to their preferences: age, sexual positioning, race, scene, HIV status, etc. (ROSSER et al, 2011).

Research on how community involvement, whether through traditional environments or new technological means, has affected behavior that has potential for exposure to the risk of HIV infection is unclear and often conflicting. The Internet is a space in which both risk factors (eg trust and honesty assumptions) and protection factors (partner selection based on expectations, rules, and safer sex negotiation) can occur simultaneously (BRITO; CASTILHO; SZWARCWALD, 2015; ROSS; TIKKANEN; BERG, 2014).

Within this environment offered by the Internet, stand out the applications that are configured as social networks for relationships. Recently, the migration of social networks to smartphones and tablets allowed a greater interaction between the virtual space built by the subjects, with their real and personal world, further modifying the profile of the relations, and streamlining, in a certain way, the possibility of occurrence sexual encounter and practice. The impact that the use of these technologies provoke in the day-to-day, as tools that help the socio-spatial relations, are easily perceived by the reconfiguration of the experiences that transform the environments (LANDOVITZ et al, 2012; LEHMILLER; IOERGER, 2014).

In this context, casual sex, originated with the help of mobile social media happens, almost always, in an unscheduled, fast, circumstantial way, at an early age, often without a condom, with high turnover of partners, since these are casual and with the possibilities to practice anal sex in groups (BOONE, COOK, WILSON, 2013; BARAL, 2015).

Thus, there are basically two types of relationship applications: apps for the general population, and those targeted only at specific populations such as Lesbian, Gay, Bisexual, Transvestite, Transsexual and Transgender (LGBT+). Within each type, there are two subtypes: dating-only apps that result in sex and those intended for "dating/affective

relationships," which may or may not result in sexual intercourse. These include: Grindr®, SCRUFF® and Hornet®, the most popular in Brazil and worldwide.

In 2013, Grindr®, the most popular of these apps, had six million users in 192 different countries, with 2.5 million new users added in the previous year alone. In its official PlayStore page SCRUFF® states that more than 50 million messages are exchanged per week, involving more than 5 million users: gay, bisexual and "curious" from all over the world. Similar to other applications, the Hornet® stands out because it has the "Know Your Status" option (used in the app as: KYS) in which it promotes the awareness of its users about knowing its own serological status, as well as of their possible partners (GOOGLE, 2015; HORNET, 2015).

The use of these apps by this community is featured around the world. In the USA, where almost all young adult population has a cell phone (93.9%); 65% report accessing the Internet through their mobile phones, of which 72% report using social networking sites and accessing 48% of these social networking sites through their mobile phones (LENHART et al, 2010). The Brazilian Institute of Geography and Statistics (IBGE), through the National Household Sample Survey (Pnad), reported that at least 80.4% of Brazilian families already use smartphones as the main means of accessing the Internet, to the detriment of computers, notebooks and tablets (CETIC, 2015).

The adoption of Internet-based services to facilitate sexual partnership has been the subject of a study to track sexually transmitted infections (STIs) through electronic social networks. The results of these studies show that these applications are tools to improve targeted recruitment for HIV prevention studies and interventions within this population (BURREL et al, 2012).

The MSM population often has limited access to information, condoms, lubricants, education, and support to reduce sexual risk for HIV. Fear of disapproval and discrimination on the part of health care providers may also deter many MSM from seeking access to conventional health services (BEYRER et al, 2012; SULLIVAN et al, 2012). Added to this are the social and legal disadvantages that increase the vulnerability of this group, the program deficits (LIMA; SOUZA; DANTAS, 2016).

Such deficiencies become more evident in the areas of education, security, fundamental rights and, above all, universal access to health (MELLO; AVELAR; BRITO, 2014). Thus, the importance of creating mechanisms to increase the perception and awareness of vulnerable populations and the scientific community about contexts, life trajectories and

interrelational processes that may make them more vulnerable to HIV/aids (SALETTI FILHO et al, 1999).

Recently, literature has shown a breakthrough in studies on applications, with a rise in intervention studies. A review study outlined the main functions of these interventions, such as: provision of information, health assessment, health promotion or adherence reminders, delivering prevention interventions or referrals to services (HALL et al, 2017; SULLIVAN et, 2015). This versatility for deliver interventions demonstrates how these technologies should be incorporated into health services, especially in combating new infections.

1.1.3 Men who have sex with men vulnerability to HIV infection

The term vulnerability refers to susceptibility and is defined as the state of individuals or groups that, for a certain reason, have their capacity for self-determination reduced, presenting potential difficulties to protect their own interests (ANTUNES; PAIVA, 2013). This reduction may be due to factors such as deficits in power, intelligence, education, resources, strength, or other attributes. Thus, among the various vulnerability concepts, the point of view of the three categories of vulnerability proposed by Ayres (2003) et al., which are: individual, social and programmatic, was used to explain the exposure of certain populations to risk off diseases, in particular those of a transmissible nature.

Individual vulnerability is composed of cognitive factors, comprising biological, emotional, attitudinal and social relations aspects and can be understood as the quantity and quality of information that individuals have, together with the capacity to elaborate it. Social vulnerability is characterized by cultural, social and economic aspects that determine the access opportunities of the subjects to goods and services, whereas the programmatic refers to the social resources necessary for the protection of the individual to risks to the integrity and the physical, psychological and social well-being. In this way, the vulnerability itself depends on the combination of the elements of the three domains mentioned at the same time (MANN; TARANTOLA, 1996).

Thus, vulnerability is related to behaviors that create opportunities for people to contract diseases, that is, related to both objective conditions of the environment as well as cultural and social conditions in which behaviors occur, as well as the degree of awareness that these people have about such behaviors and the effective power they can exert to transform them (MANN; TARANTOLA, 1996).

Vulnerable behaviors in relation to the HIV infection presented by the individuals, are based on the possibility of the occurrence of the infection, evaluated from factors such as the understanding they have about the severity of the infection and the protective behavior presented, for example, using the condom, thus determining the behavior of the individual, placing them at greater risk of contracting the virus or not (NODIN, CARBALLO-DIEGUEZ, LEAL; 2015).

Among MSM are added social vulnerability factors such as sexual oppression, family and social violence (homophobia), and individual factors, such as sexual practices, behaviors and knowledge. These two factors are still permeated by a significant programmatic vulnerability, since the health system still follows a heterosexist logic that is not prepared to support the LGBT population, which causes them to present worrying levels of HIV and deserve more and more Attention to prevention initiatives (MOSCHETA; SOUZA; SANTOS, 2016). In this sense, the objective of this study is to analyze the vulnerabilities of men who have sex with men, users of geosocial applications to HIV infection.

2 AIMS

2.1 General

- To analyze the vulnerabilities of men who have sex with men, users of geosocial applications to HIV infection.

2.2 Specific

- Analyze in the literature the relationship between the use of geosocial network applications and the risk behaviors for HIV infection by MSM;
- Assess the knowledge of men who have sex with men using a geolocation-based dating application on HIV/aids and its implications for establishing sexual partnerships.

3 METHODOLOGY

3.1 Study Design

In view of the above and our objectives, the study was structured with two consecutive stages namely:

3.2 Step 1: Integrative Literature Review

The first stage consisted of an integrative review of the literature, aiming to determine and to investigate the vulnerabilities of men who have sex with men using geosocial dating applications.

It is one of the main resources of evidence-based practice, a technique that allows us to summarize the past of the empirical literature, and provide a comprehensive understanding of a phenomenon to be studied (MELNYK et al; 2011)

For its development, the following steps were developed: establishment of the guiding question; Sample selection; Definition of study characteristics (inclusion and exclusion criteria); Analysis of studies included in the review; Interpretation of the results and presentation of the revision or synthesis of knowledge.

The research question was guided by the question: "Does using geospatial applications to find partners increase risk behaviors for HIV/aids infection by men who have sex with men?" The question was defined using the PICOT strategy, acronym for Patient, Intervention, Comparison, Outcomes and Time. Thus defined P, men who have sex with men; I, use of geosocial encounter and O applications, risk behaviors; (Comparison and Time were not the object of this study).

It should be noted that we use the descriptor "risk behaviors" because it is the closest to our study object, so that despite the term "risk", the findings were analyzed by the vulnerability reference (AYRES, 2003).

Were used the databases: *Cumulative Index to Nursing and Allied Health Literature* (CINAHL), *Literatura Latino-Americana e do Caribe em Ciências da Saúde* (Lilacs), *Science direct*, *Web of Science*, *Web of Knowledge e Medline* via portal *PubMed* da *National Library of Medicine*.

The bibliographic search occurred concurrently in the seven databases. It should be emphasized that the selection of the articles was performed in pairs, separately, in order to avoid biases in the screening of articles to be analyzed.

4.3 Step 2: Descriptive exploratory study

Descriptive study with 30 Hornet® users recruited in the application by the Time-Location Sampling (TLS) technique, between July and August of 2016. For online recruitment, an adaptation of the TLS technique was used. In this technique, the researchers must identify places and times commonly visited by the population of interest (in the case: MSM), after this identification is randomly selected which locations will be the scenario of data collection (STUEVE et al, 2001). The data collection provided by the TLS modified to virtual reality, which allowed the simultaneous collection in the two cities without the displacement of the researchers, who used their own settings to change their position, and allocate the users who wanted access to the city desired at the time.

In our work, we modified this selection to be done online, without necessarily displacing the researchers, who could take advantage of the application's own settings to change its position, as well as allocate the users to whom they want access. This strategy allowed the construction of a sampling frame for the analysis of a wide and diverse number of users (figure 1).

The interview was guided by a semi-structured questionnaire, with questions about sociodemographic profile and sexual behavior and open-ended questions about establishing sexual partnerships, prevention strategies and the use of applications.

The statements generated had statistical treatment in the IRaMuTeQ software, later analyzed by the Descending Hierarchical Classification. In the data collection, the Computer-Assisted Interview technique (CASI) was used, in which subjects approached through the application itself were invited to answer the study questions. The collection was performed by two properly trained researchers, who registered in the application to have access to the users and created a public profile. The first online users, who recorded the current HIV/aids serological status in their profile, were discussed. When the participant expressed disinterest in the research, the approach was continued to the next user.

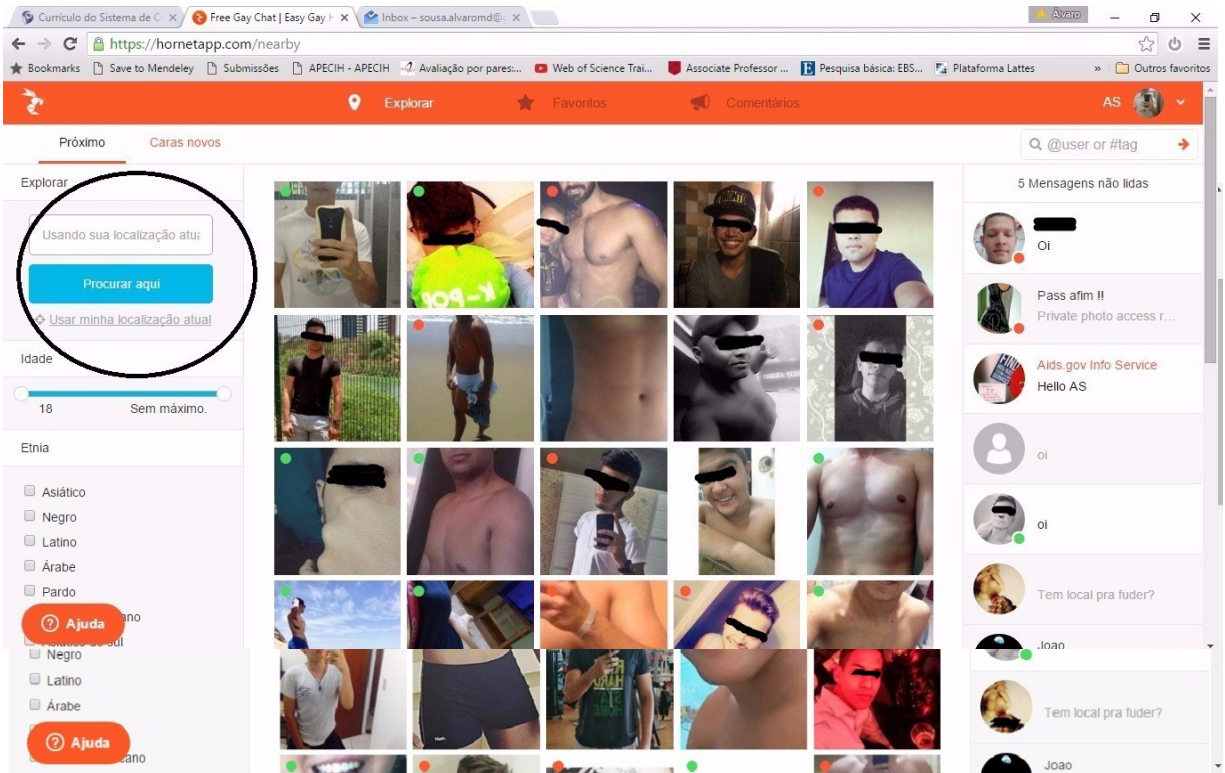


Figure 1 - Users available in the Hornet application in Teresina, PI, Brazil

Source: HORNET (2016).

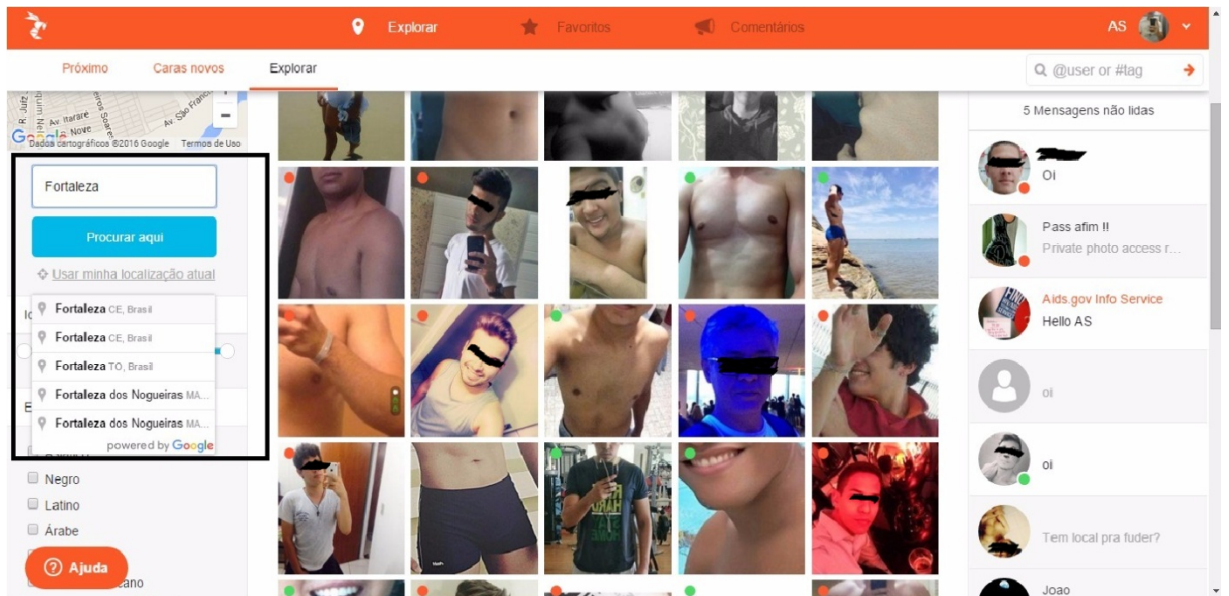


Figure 2 - Users available in the Hornet application in Fortaleza, CE, Brazil, after the change of geospatial location.

Source: HORNET (2016).

For this online interview stage, the CASI technique was used for personal computer-assisted interviews, the choice for this technique was based on studies that indicate that interview methods that increase participant privacy have dramatically increased reports of sensitive or "taboo" subjects, being well accepted by participants (DAMACENA; SZWARCWAŁ; SOUZA JÚNIOR, 2014).

3.4 Ethical aspects

The research was conducted in accordance with the recommendations contained in Resolutions 466/12 (BRASIL, 2012) and 510/16 (BRAZIL, 2016) of the National Health Council (NHC), which brings together ethical aspects in research involving human beings in social research.

The participant was provided with the Free and Informed Consent Form (FICF), since they will not have access to the research participants, email, or address. However, when accessing the form, the participant will necessarily have to read the FICF, and thus select that they wish to participate in the research according to Appendix 2.

It is emphasized that all research involving human beings involves risk. The eventual damage can be immediate or late, compromising the individual or the collectivity. The mere exposure of the image, personal information, the act of responding to a questionnaire or being approached in an interview, poses risks to the subjects since it could cause embarrassment or bring to the memory experiences or situations that cause psychic suffering.

It is noteworthy that the information provided by them had their privacy guaranteed by the researchers responsible, ensuring follow all ethical recommendations of the NHC (466/12). The subjects of the research were not identified at any time, even when the results of this research are divulged in any way. The benefit to the subject expands to a greater knowledge of probable vulnerabilities of a population marginalized by society, health and science. It is hoped that at the end of the study it may contribute to the better knowledge of the profile of MSM users of geosocial encounter applications, pointing to gaps, as well as options for approaching, capturing and managing them with health services.

4. Results

4.1. Integrative Review

**Published in the journal: Journal of the Association of Nurses in AIDS Care
RISK BEHAVIOURS FOR HIV/AIDS INFECTION BY MEN WHO HAVE SEX
WITH MEN THROUGH GEOSOCIAL NETWORKING PHONE APPS.**

QUEIROZ, A.A.F.L.N. et al. A Review of Risk Behaviors for HIV Infection by Men Who Have Sex With Men Through Geosocial Networking Phone Apps. **J Assoc Nurses AIDS Care**, 2017.

JANAC manuscript slated for publication



Kristen Overstreet para mim, aaflnqueiroz >
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JANAC-D-16-00119R4 - A Review of Risk behaviors for HIV infection by men who have sex with men through geosocial networking phone apps

Dear Mr. Queiroz,

I am pleased to inform you that your accepted manuscript (referenced above) has been sent to the Production Editor today. You should soon receive a request for copyright transfer by e-mail. The accepted version of your paper will be made available online on our Articles in Press platform (www.nursesinaidscaresjournal.org) in about 5 business days. Your article will include a DOI number and will be fully citable.

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Thank you for submitting your work to JANAC. We look forward to publishing your paper.

Sincerely,
Kristen

...



Responder a todos



Accepted Manuscript



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Disclosures

The authors report no real or perceived vested interests that relate to this article that could be construed as a conflict of interest.

Abstract

The purpose of our review was to analyze the relationship between the use of geosocial networking phone apps and risk behaviors for HIV infection in men who have sex with men (MSM). The review was guided by the question: *Does the use of geosocial networking apps to find sex partners increase risk behaviors for HIV infection by MSM?* We searched the databases PubMed, Web of Science, CINAHL, and LILACS, considering primary studies published up to December 2015, without any time restraint. All 14 studies that met our search criteria analyzed sexual behaviors in relation to sociocultural and economic characteristics, number of partners, unprotected anal sex, drug use, HIV testing, risk management measures, and the presence of other sexually transmitted diseases. The results indicated that use of geosocial networking apps to find sex partners may lead to new patterns of behavior and relationships that place MSM at risk for HIV.

Key words: integrative literature review, men who have sex with men, mobile phone applications, sexual behavior, social networks

A Review of Risk behaviors for HIV infection by men who have sex with men through geosocial networking phone apps

HIV is a condition that is not restricted to specific populations. It also involves key risk behaviors such as condomless or unprotected anal and/or vaginal sex, and injection drug use; it can affect anyone, without discrimination. HIV is a pandemic, infectious disease; it is caused by a virus and is not delimited by geopolitical barriers. Its epidemiological characteristics and patterns may vary according to social context and geographic region. Understanding these differences and specificities contributes to global vigilance about the epidemic and the implementation of more effective interventions (Kagotho & Ssewamala, 2012; Kamat et al., 2013).

Although heterogeneity of cases is observed in the worldwide population, more recent studies have indicated key groups for infection control in this global epidemic. One such group, men who have sex with men (MSM), stands out among these groups, by showing higher prevalence rates than the general population (Beyrer et al., 2012; Joint United Nations Programme on HIV/AIDS [UNAIDS], 2010; Malavé, Ramakrishna, Heylen, Bharat, & Ekstrand, 2014).

One of the characteristics of HIV infection is that its agent is both transmitted and prevented through a common factor: behavior. Risk behaviors for HIV infection are identified by risk assessment and management, and individuals may engage in both protective and risky behaviors (Nodin, Carballo-Diéguez, & Leal, 2015).

The literature has clearly presented evidence that points to high HIV prevalence, lack of awareness of HIV-infection status (both self and partners), unprotected anal sex, and increased drug use during sexual activity as contributing substantially to new infections among MSM (Landovitz et al., 2013). Associated with these behaviors, incidence of HIV infection may increase with the use of geosocial networking applications (apps) to make

friends, arrange dates, and start relationships. These mobile apps are sometimes used to arrange for occasional sexual intercourse, without adopting prevention measures (Boone, Cook, & Wilson, 2013).

Many MSM use these apps, especially younger men (< 20 years). Casual sex through social networking apps is almost always quick, unplanned, circumstantial, and at a young age (Landovitz et al., 2013). In most situations, MSM using these apps do not use condoms, change partners frequently (because the relations are casual), and include the possibility of group sex (Baral et al., 2015; Beyrer et al., 2013; Boone et al., 2013; Muessig et al., 2013).

Despite the importance of social media and apps to arrange dates, few studies have evaluated the relationship between the use of geosocial networking apps and increased risk behaviors for sexually transmitted infections (STIs). In addition, insufficient public policies as well as social and legal disadvantages increase the vulnerability of this group and become obstacles to health services (Beyrer et al., 2012; Beyrer et al., 2013; Sullivan et al., 2012).

Two questions guided this literature review: *Does the use of geosocial networking apps to find sex partners increase the risk of HIV infection for MSM?* and *How can geosocial networking apps facilitate HIV acquisition and transmission?* The objective of our literature review was to analyze the relationship between the use of geosocial networking apps and risk behaviors for HIV infection by MSM.

Method

We completed an integrative literature review, one of the main methods used for evidence-based practice. The method seeks to summarize empirical literature produced about a phenomenon, and thus provide a more comprehensive understanding of it (Whittemore & Knafel, 2005). The development of our study involved the following steps: (a) definition of the objective, (b) definition of inclusion and exclusion criteria for sampling purposes, (c) search and selection of primary studies, (d) data extraction of selected studies, and (e) analysis and

discussion of results.

MeSH descriptors were used for online searches in MEDLINE databases via the PubMed portal of the U.S. National Library of Medicine and the Web of Science. Combined descriptors and key words were used for the CINAHL and LILACS databases. Terms in Portuguese, English, and Spanish were used for LILACS; English terms only were used for the other databases.

Inclusion criteria were primary studies for which full texts were available that had been published up to December 2015. Book chapters, theses, dissertations, and technical reports were excluded from the initial search. The searches were conducted December 1-15, 2015, simultaneously by two investigators.

The following descriptors were used: sexual behavior; men who have sex with men; sexually transmitted diseases; and social networks. Key words and descriptors belonging to the same category were separated by "OR" and descriptors belonging to different categories by "AND." The terms used in the search were classified by the databases:

- PubMed and Web of Science (MeSH descriptors): *sexual behavior OR sexual AND behavior; OR sexual behavior AND men OR men AND sex OR sex AND men OR men AND sexually transmitted disease; OR sexually AND transmitted AND diseases; (All Fields) OR sexually transmitted diseases AND social support OR social AND support OR social support OR social AND networks OR social networks.*
- CINAHL (CINAHL titles): *sexual behavior AND men who have sex with men AND sexually transmitted diseases AND social networks OR social media.*
- LILACS (descriptors and keywords): *sexual behavior AND men OR men's, AND behavior AND sexual OR sexuality, behavior OR sexually transmitted diseases AND sex AND social networking, and corresponding terms in Portuguese and Spanish.*

Analysis for study selection was conducted in three stages, as follows. First, the studies

selected from the databases were analyzed and preselected, observing inclusion and exclusion criteria, by reading titles and abstracts. For articles with no abstracts, or if the abstracts didn't allow article exclusion or inclusion, articles were read. Studies ($n = 625$) were extracted from PubMed, CINAHL ($n = 9$), LILACS ($n = 25$), and Web of Science ($n = 194$), totaling 853 studies. In the second stage, the 853 studies were analyzed in terms of potential inclusion in the study, evaluating possible fulfilment of the study questions, along with the type of investigation, objectives, sample, method, outcomes, results, and conclusions, resulting in retention of 35 articles. In the third stage, the full texts of all 35 articles were read in order to collect specific data for the objectives of the review, and the number was reduced to the 14 articles selected for our study (see Figure 1). This stage was conducted by three investigators, who carried out online meetings to discuss and reach consensus about whether every article should be included or excluded. Two other articles from references of the selected articles were also included. The reasons for the exclusion of the other 841 studies are shown in Table 1.

Reasons	Number excluded ($N = 841$)
Study not conducted with MSM, gays, or bisexuals, either involving women or non-heterosexual and heterosexual men.	153
Study involved MSM, gays, or bisexuals, but did not evaluate risk behaviors.	187
Study analyzed MSM, gays, or bisexuals, but evaluated risk behaviors in ways other than networking phone apps.	355
Study analyzed MSM, gays, or bisexuals, evaluated risk behaviors through social media, but not geosocial networking phone apps (Facebook, Myspace, online chat)	64
Literature reviews	36
Methodology studies	15
Duplicate studies	27
Reflexive studies	3
Technical reports	1
<i>Note.</i> MSM = men who have sex with men.	

Results

The 14 studies included in the review were identified as A1 to A14. All were in English, with a predominance of studies conducted in the United States ($n = 12, 85.7\%$). They were mostly published in 2015 ($n = 6, 42.8\%$) and, in terms of study design, they were mostly descriptive studies ($n = 12, 85.7\%$; Table 2).

#	Title	Publication year	Country	Study design
A1	A study of intimate partner violence, substance abuse, and sexual risk behaviors among gay, bisexual, and other men who have sex with men in a sample of geosocial networking smartphone application users (Duncan et al., 2015).	2015 Ahead of print	United States	Cross-section
A2	Association of unprotected anal intercourse with Grindr-met partners among Grindr-using young men who have sex with men in Los Angeles (Winetrobe, Rice, Bauermeister, Petering, & Holloway, 2014).	2014	United States	Cross-sectional descriptive
A3	Epidemiology, sexual risk behaviors, and HIV prevention practices of men who have sex using Grindr in Los Angeles (Landovitz et al., 2013).	2013	United States	Cross-sectional descriptive
A4	Social networking smartphone applications and sexual health outcomes among men who have sex with men (Lehmiller & Ioeberger, 2014).	2014	United States	Cross-sectional analytical
A5	Gay apps for seeking sex partners in China: Implications for MSM sexual health (Bien et al., 2015).	2015	China	Cross-sectional descriptive
A6	Geosocial networking app usage patterns of gay, bisexual, and other men who have sex with men: Survey among users of Grindr, a mobile dating app (Goedel & Duncan, 2015).	2015	United States	Cross-sectional descriptive
A7	Network influences on the sexual risk behaviors of gay, bisexual and other men who have sex with men using geosocial networking applications (Holloway, Pulsipher, Gibbs, Barman-Adhikari, & Rice, 2015)	2015	United States	Cross-sectional analytical
A8	Partner disclosure of PrEP use and undetectable viral loads on geosocial networking apps: Frequency of disclosure and decisions about condomless sex (Newcomb, Mongrella, Weis, McMillen, & Mustanski, 2016)	2015 Ahead of print	United States	Cross-sectional descriptive; mixed approach

A9	Sex on demand: Geosocial networking phone apps and risk of sexually transmitted infections among a cross-sectional sample of men who have sex with men in Los Angeles county (Beymer et al., 2014)	2014	United States	Cross-sectional analytical
A10	Sex risk among young men who have sex with men who use Grindr, a smartphone geosocial networking application (Rice et al., 2012).	2014	United States	Cross-sectional descriptive
A11	Sexual risk behaviors among apps-using young men who have sex with men in Hong Kong (Yeo & Ng, 2016).	2015	Japan	Cross-sectional descriptive
A12	Use of geosocial networking (GSN) mobile phone applications to find men for sex by men who have sex with men (MSM) in Washington, DC (Phillips et al., 2014).	2014	United States	Cross-sectional descriptive
A13	Use of the internet and mobile-based “apps” for sex-seeking among men who have sex with men in New York City (Grosskopf, LeVasseur, & Glaser, 2014).	2014	United States	Cross-sectional analytical
A14	Use of the location-based social networking application Grindr as a recruitment tool in rectal microbicide development research (Burrell et al., 2012).	2012	United States	Randomized clinical trial

Note. PrEP = pre-exposure prophylaxis; MSM = men who have sex with men.

Grindr was the most analyzed app ($n = 12$, 85.7%). Wide variation was observed in sample sizes. Most studies evaluated risk behaviors in relation to sociodemographic, cultural, and economic characteristics; drug use; number of partners; unprotected anal sex; and presence of other sexually transmitted diseases (Table 3).

Table 3

Articles According to Primary Objective, App Analyzed, Sample Size, and Main Results

#	Primary objective	App analyzed	Sample size	Main results
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A1	Investigate relations between experiences of intimate partner violence and the use of substances and sexual risk behaviors in a sample of MSM via Grindr.	Grindr	175	The average number of partners in the last 3 months varied according to sexual behaviors, especially whether partners were found on apps. Insertive sex and being submitted to violence were associated with a higher number of partners, higher frequency of condomless sex, and partners found on apps. Having suffered physical violence increased with the number of partners for oral sex and partners via the app. Suffering individual violence was associated with higher chances of drug use and other risk behaviors. Suffering violence through intimidation was associated with substance abuse, and isolation was associated with (passive) anal sex, which was associated with risk behaviors and more partners via the app.
A2	Analyze the associations of unprotected anal sex with partners found via Grindr in young MSM in Los Angeles.	Grindr	195	Of 146 young MSM who reported sexual relations with partners found via Grindr, 20% had unprotected anal sex in the last sexual relation. Young MSM on Grindr for at least 1 year tended to show naked chest or abdomen in profile pictures, and reported that partners found via the app were more likely to have unprotected anal sex. Longer time of app use lead to greater familiarity with it, which was associated with unprotected anal sex with partners known in the app.
A3	Characterize epidemiology, risk behaviors, HIV status and HIV testing behavior, and the adoption of HIV prevention strategies among young MSM who use Grindr in the metropolitan region of Los Angeles.	Grindr	375	Most participants reported high numbers of sex partners, unprotected anal sex, and low perception of HIV risk. 83.1% reported they had been tested for HIV in the last 12 months; 4.3% had never been tested. However, 4.5% reported they were infected with HIV, which was associated with increased numbers of anal sex partners in the last 3 months, inconsistent HIV testing of partners, and reporting that app use was also to “make friends.” Drug use reported by 48%; of these, more than 90% used drugs during sex. Men found via Grindr presented high risk of HIV transmission or acquisition.
A4	Learn about sex life of MSM who look for sex partners via mobile apps and compare sexual health and personalities of app users and non-users.	Grindr Adam4 Adam GROWR SCRUFF Manhunt	112	App users had a higher average number of sex partners than app non-users in the last 3 months and in the last month. However, no difference was observed in sexual practices of the groups (receptive or insertive anal sex, with or without condoms), and no difference observed when comparing HIV history or frequency and results of HIV testing. App users presented higher probability of having one diagnosed STI and more lifetime sex partners.

A5	Analyze sociodemographic characteristics and sexual behaviors of Chinese MSM who use geosocial networking apps compared to MSM who do not use apps.	Jack'd Grindr Blued BoyAhoy	1,342	Compared to non-users, app users were younger, of higher education level, assumed they were gay, and single. They were also more likely to have more sex partners and more frequent HIV testing.
A6	Describe the use of geosocial networking apps and recent sexual behaviors of MSM in the Atlanta metropolitan area.	Grindr	92	For MSM: 38% reported use of mobile apps to find new sex partners; 18.5% used apps to "kill time" when feeling bored. Users who reported being in relationships were less inclined to use apps to make friends with other MSM, but more inclined to use apps for sex. Interviewees had an average of 3.11 mobile app accounts. Most were more active on apps in the afternoon and at night (40.2%) and on weekdays (64.1%). App users checked mobile apps an average of 8.38 times a day and spent an average of 1.31 hours on them. App use initiation was associated with age at first sexual experience for both insertive and receptive anal sex.
A7	Understand if inclusion of individuals met via geosocial networking apps in social circles was associated with increased risk behaviors for HIV in a probability sample of MSM from Los Angeles.	Jack'd Grindr Blued BoyAhoy	295	MSM who used gay apps were more likely to be younger, single, and students or had at least one college degree. MSM self-reported as gay, and had "assumed" their homosexuality, in comparison to non-users. MSM who used apps were almost twice as likely to have had at least two male anal sex partners in the last 3 months.
A8	Investigate the frequency of MSM who find potential sex partners on apps and who also use any type of biomedical prevention.	Not informed	2,098	Most had found potential sex partners who used PrEP or had undetectable viral loads, using it as a prevention strategy. Most MSM who met these partners had had condomless anal sex at least once. Qualitative analysis found that most who reported unprotected anal sex did so after they "calculated" HIV transmission risk. Strategies for risk reduction were identified, such as "biomedical combination": having condomless anal sex only when both partners used PrEP or had undetectable viral loads.

A9	Determine if MSM self-reported as HIV uninfected and users of clinical HIV services who used geosocial networking apps present higher rates of STIs compared to uninfected MSM who met in person.	Grindr	7,184	App users reported more drug use compared to those who met their partners in person and presented a higher proportion of other STIs such as gonorrhea and chlamydia. However, individuals who only used apps had a lower proportion of HIV (1.9%). App users reported greater use of cocaine and ecstasy.
A10	Evaluate motivations of young MSM who use apps and their risk behaviors for HIV in relations with other app users.	Grindr	195	Although they used the app for several purposes (entertainment, social media, connection with gay community), most app users said they used apps for casual sex only (95.1%), and reported more relations than those who did not use apps (average = 2.4, 1.1, respectively). Most who arranged their last sexual relation via app said they used condoms (59.8%). Only 14.7% reported unprotected anal sex with last partner arranged via Grindr; they also reported higher rates of anal sex with male partners than those who did not report unprotected anal sex with partners found on Grindr.
A11	Assess risk behaviors among young MSM who use apps in Hong Kong.	Grindr Jack'd	213	Differences observed in sexual behaviors related to app use. For young MSM app users, infrequent use of condoms was common, especially with casual partners (45.8%). 19.3% of sample reported condomless internal ejaculation for insertive sex and 19.8% for receptive sex. Finding sex partners via apps doubled the chance of unprotected anal sex with regular partners (ORa = 1.99) and non-regular partners (ORa = 2.17). Condomless anal sex was more common for men who were not in a steady relationship (ORa = 3.25) and who used drugs during sex (ORa = 3.79). However, chances were reduced in cases of group sex (ORa = 0.15). Condomless insertive anal ejaculation increased in non-exclusive relations (ORa = 4.10), with more recent partners (ORa = 2.47), and with use of alcohol (OR = 4.04). For condomless insertive internal ejaculation, the chance increased among bisexuals and in exclusive, lengthier relationships.

A12	Identify the prevalence of meetup apps and compare app use to find sex partners to other virtual ways.	Not clear	379	In MSM, 63.6% used apps; of these, 58.9% were looking for sex partners, had assumed they were gay (91.7%; OR: 2.18), and had been tested for HIV (96.7%; OR: 0.60); 11.4% were HIV infected. Of these, 59.8% had had five or more sex partners in last 12 months, 59.3% had steady and casual partners, and 32.4% had only casual partners. MSM who had used apps to find other men in last 12 months were more likely to identify themselves as homosexual (ORa = 3.20), have been tested for HIV in last year (ORa = 2.03), reported depression symptoms (ORa = 2.89), and believed their last male sex partner had other partners (ORa = 2.27).
A13	Evaluate extent to which Internet and apps are used to help satisfy MSM in gay identity affirmation and search for sexual satisfaction; analyze how these are associated with use of apps and Internet.	Grindr Jack'd Scruff etc.	126	A high frequency of app use was identified, and a preference for meeting men via apps (overall: 47.2%). Most participants met other men via an app, had sex soon after they met (96.5%), and had unprotected anal sex (57.7%). They identified themselves as gay and as part of this subculture, but presented low levels of internalized homophobia. No variables reported any difference between partners met via the Internet and apps.
A14	Compare sociodemographic characteristics and risk behaviors in MSM recruited via Grindr vs. MSM recruited via other communication vehicles.	Grindr	105	The study showed that investigating sexual behaviors of MSM via apps was more effective than other methods. Frequency of unprotected (insertive and receptive) anal sex was recorded for lifetime, last year, last 3 months, and last 14 days. MSM who used apps had had more sex partners in the last 14 days (1.88 vs. 1.10), and more receptive anal sex (2.0 vs. 1.8) and insertive anal sex (2.5 vs. 1.9), than the other MSM in the study.
<i>Note.</i> ORa = Odds ratio adjusted; OR = odds ratio; MSM = men who have sex with men; PrEP = pre-exposure prophylaxis; STI = sexually transmitted infection.				

Sociodemographic Characteristics

The studies showed a predominance of young people (< 20 years of age) and young adults (20 to 25 years of age; Beymer et al., 2014; Bien et al., 2015; Burrell et al., 2012; Duncan et al., 2015; Grosskopf et al., 2014; Lehmler & Iorger, 2014; Newcomb et al., 2016; Phillips et al., 2014; Winetrobe et al., 2014; Yeo & Ng, 2016). Younger ages were associated with higher frequency of app use, greater search for sex via apps, a higher number of sexual partners (Burrell et al., 2012; Grosskopf et al., 2014; Holloway et al., 2015), and a

higher chance of prior STI (Beymer et al., 2014; Holloway et al., 2015).

Use of Apps

The studies showed that MSM were familiar with apps and reported high frequencies of app use for long periods – 1 year or more. The use of apps was reported to be daily or several times during the week, and apps were commonly used in the afternoon and at night, on weekdays, and weekends (Holloway et al., 2015; Grosskopf et al., 2014; Landovitz et al., 2013; Winetrobe et al., 2014; Yeo & Ng, 2016). The main reasons for using apps included finding sex partners (Goedel & Duncan, 2015), making friends (Lehmiller & Iorger, 2014; Rice et al., 2012), and "killing time" (Goedel & Duncan, 2015; Rice et al., 2012).

Sexual Behaviors and Vulnerability

Searching sex partners on apps occurred even when MSM were in steady relationships, indicating that they had multiple partners (steady and casual partners; Holloway et al., 2015; Lehmiller & Iorger, 2014; Yeo & Ng, 2016). Depending on how sex occurred (with or without protection, receptive or insertive anal sex), an important chain for the transmission of STIs was identified. In addition, arranging sex via apps showed strong characteristics of immediacy (Grosskopf et al., 2014; Newcomb et al., 2016) and recurrence (Landovitz et al., 2013).

The studies identified high frequency of unprotected anal sex (Bien et al., 2015; Burrell et al., 2012; Duncan et al., 2015; Goedel & Duncan, 2015; Grosskopf et al., 2014; Holloway et al., 2015; Phillips et al., 2014; Winetrobe et al., 2014; Yeo & Ng, 2016) as well as partner changing during a lifetime and in the last few months (Burrell et al., 2012; Holloway et al., 2015; Lehmiller & Iorger, 2014; Phillips et al., 2014; Winetrobe et al., 2014; Yeo & Ng, 2016). Studies that assessed the incidence of other STIs highlighted gonorrhea, syphilis, and chlamydia (Beymer et al., 2014; Holloway et al., 2015).

HIV testing was investigated in various studies (Bien et al., 2015; Goedel & Duncan,

2015; Holloway et al., 2015; Lehmiller & Ierger, 2014; Newcomb et al., 2016) and the results varied widely. However, in all studies, testing rates were self-reported, which may be an important bias. Drug use was also high in all studies that evaluated this variable, and it was always associated with unprotected anal sex (Duncan et al., 2015; Landovitz et al., 2013; Winetrobe et al., 2014; Yeo & Ng, 2016). The more common drugs indicated in the studies were alcohol, marijuana, ecstasy, cocaine, and inhaled substances (poppers; Beymer et al., 2014; Duncan et al., 2015; Landovitz et al., 2013; Winetrobe et al., 2014). Drug use was also associated with a history of other STIs (Beymer et al., 2014).

Discussion

This is the first integrative review to investigate the relationship between the (a) use of geosocial networking apps to arrange dates and (b) risk behaviors for HIV infection by MSM. The Internet is a popular tool for sex searches among MSM for many reasons. It is an effective and convenient way to locate sex partners more quickly than other traditional and offline ways. The Internet also allows MSM to screen partners according to their preferences: age, sexual orientation, ethnicity, and HIV status, among others (Rosser et al., 2011). However, the use of smartphones and tablets to access social media, combined with the possibility of finding someone's location using the Global Positioning System, has allowed greater interaction between the virtual and real worlds, further changing the profile of relations and speeding the possibility of dates and sexual practices, creating a new and unique experience for the manifestation of sexuality (Brito et al., 2015).

In 2013, Grindr[®] became the most popular of these applications, with about six million users in 192 countries. In the virtual environment, a variety of risk factors (confidence and low perception of risk) and types of protection (serum adaptation, strategic positioning, and safe sex negotiation) tended to occur simultaneously. However, a competitive environment that encourages the consumption of people through ephemeral and casual

relationships, usually limited to sex, propitiates the constant search for new experiences to satisfy sexual needs and desires. In this scenario, quick selection of partners can put risk management in second place (Brito et al., 2015; Goedel & Duncan, 2015; Grosskopf et al., 2014; Ross, Tikkanen, & Berg, 2014).

The impact of the use of apps with geosocial networking tools on daily life can be easily seen in these new experiences, which are increasingly individual and disposable (Landovitz et al., 2013; Lehmilller & Ioerger, 2014). This is similar to modern relationships with smartphones, in which users shape devices according to their needs and discard them when they aren't needed or when better devices are found.

A mixed-methods study that analyzed risk management for HIV found that MSM combined biomedical methods to decrease HIV risk, using PrEP and undetectable viral loads. Individuals using PrEP or having undetectable viral loads had unprotected anal sex with HIV-infected partners found via apps, provided the partners had undetectable viral loads or used PrEP (Newcomb et al., 2016). The findings of our analysis were linked to risk factors (unprotected anal sex with infected individuals, but with undetectable viral loads) and protective factors (use of PrEP) that coexist and overlap in the microenvironment provided by the apps.

High familiarity with these apps and longer times as app users may further expose MSM to risk situations, as these factors ensure more effective use of app resources, optimizing time spent on apps. This means better understanding of app functionalities, characteristics, languages used by users, and efficient screening strategies to achieve goals, such as sex partners, friends, or loving relationships.

The constant use of apps may also cause changes in relationship profiles. Some studies (Grosskopf et al., 2014; Holloway et al., 2015; Landovitz et al., 2013) have indicated that MSM prefer to find sex partners via apps rather than in person. In the United States

(Phillips et al., 2014; Winetrobe et al., 2014), individuals who had used apps for 1 year or more were identified as being more inclined to use drugs, present depression symptoms, and believe their partners had other sex partners, results similar to other studies (Goedel & Duncan, 2015; Holloway et al., 2015; Landovitz et al., 2013; Rice et al., 2012; Yeo & Ng, 2016). The immediacy of relations ensured by apps does not allow for learning about a partner's preventive measures, which may expose app users to frequent risk situations.

MSM reported high numbers of recent and lifetime sex partners, as well as sexual relations immediately after meeting someone via an app (Grosskopf et al., 2014; Holloway et al., 2015). The presence of steady partners did not prevent the search for casual partners on apps (Holloway et al., 2015; Lehmilller & Ioerger, 2014; Yeo & Ng, 2016), indicating that affective/loving and sexual needs may be fulfilled by different people, which reinforces new behavior and relationship patterns. One study (Rice et al., 2012) compared searching for partners via apps versus in person and identified a greater likelihood that app partners would become casual partners.

Searching for ways to fulfil sexual needs is driven by progressively higher levels of stimulation and excitation. Individuals engage in increasingly intense and risky sexual behaviors and experiences (Boone et al., 2013). The association of drugs with sex involves a mix of sensations to increase pleasure. The use of drugs by MSM during sex was associated with unprotected anal sex and a history of other STIs (Duncan et al., 2015; Landovitz et al., 2013; Winetrobe et al., 2014; Yeo & Ng, 2016).

The results of our review show that further studies should be conducted, using other methodological designs, especially addressing interventions in health education, considering continuous growth in users of geosocial networking apps. The evidence gathered in this review provided a source for future discussion in the literature, once new evidence reveals profiles and behaviors most associated with risk for HIV infection and the use of apps.

Limitations

Our study had some limitations. Our method provided a one-sided picture of the reality investigated and only included content from the scientific literature. To perform a systematic review would have been impossible, because it would have been necessary to compare interventions, and because of the limited number of published studies, especially randomized clinical trials (Webb & Roe, 2008). The small number of published studies was an obstacle to the objectives of our study, because most published studies were conducted in the United States and had very different sample sizes.

Conclusions

The studies analyzed in our literature review found that geosocial networking apps were more frequently used by young MSM who were aiming to find sex partners. High average numbers of partners were ensured by recurrent use of apps, which allowed high frequency of recent sex (in the last few months) and lifetime sex.

Sex with partners found via apps was characterized, in general, as occasional, immediate, unprotected, with drugs, and with no information about the HIV status of partners. Finding sex partners via apps lead to new behavior and relationship patterns, placing MSM in situations with a high risk of HIV infection.

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Key Considerations

- Most studies of sexual relationships mediated by geolocation-based applications and their interface with HIV infection have been restricted to describing the phenomenon, requiring explanatory and intervention studies.
- Relationships emerging from applications have their own dynamics and characteristics that may lead to vulnerable behaviors and attitudes.
- Sex with partners found via apps was characterized, in general, as occasional, immediate, unprotected, with drugs, and with no information about the HIV status of partners.

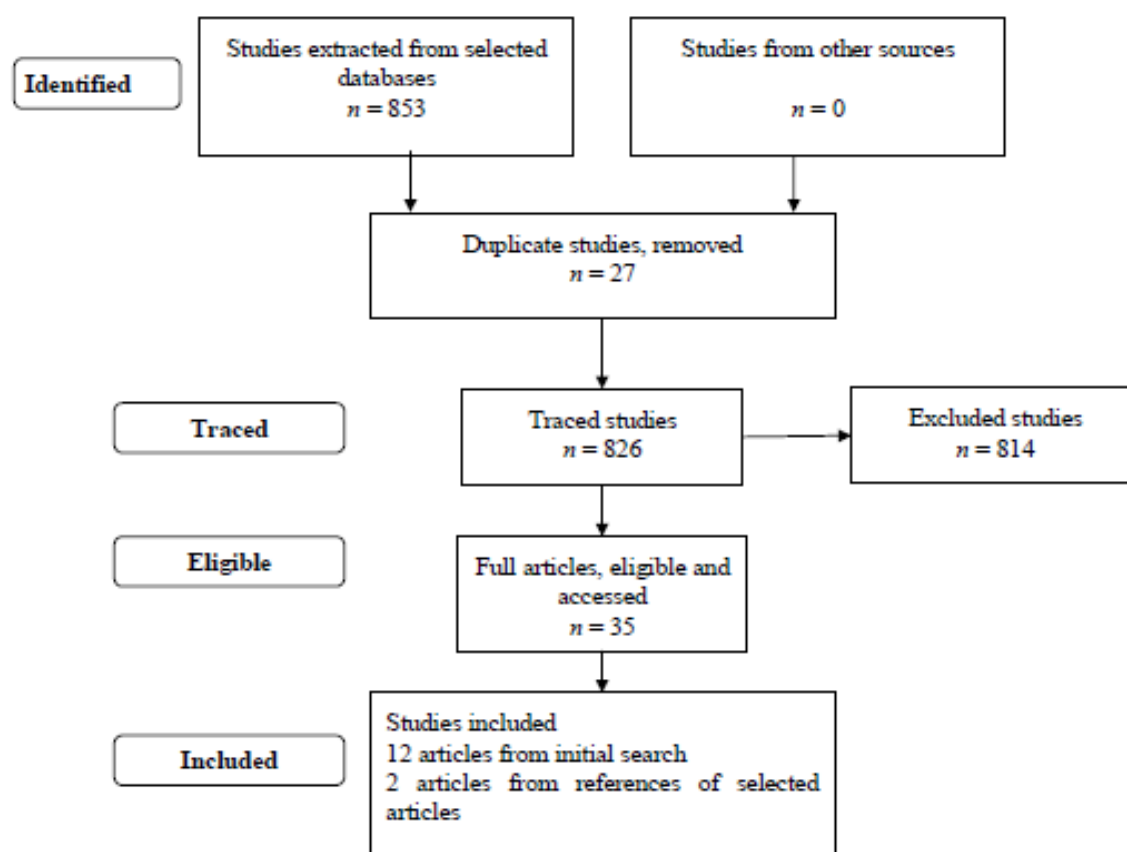
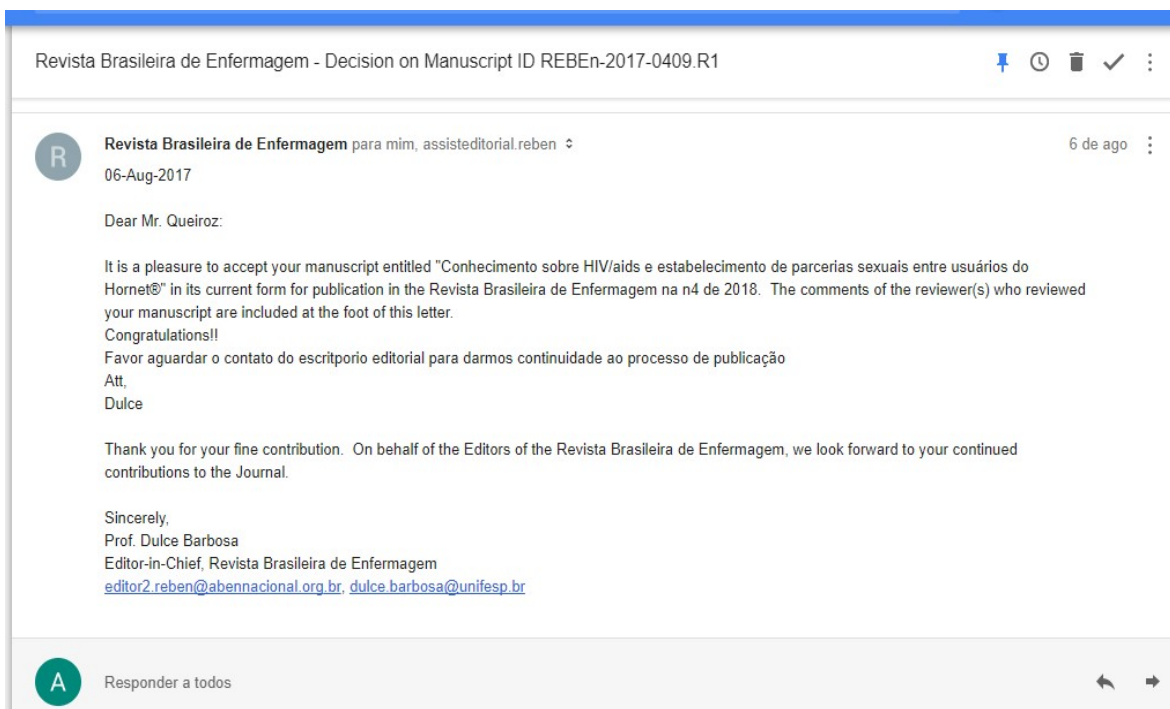


Figure 1. Flowchart for study selection.

4.2. Descriptive study

Accepted in the journal: Revista Brasileira de Enfermagem
Conhecimento sobre HIV/aids e estabelecimento de parcerias sexuais entre usuários do Hornet®.

QUEIROZ, A.A.F.L.N. et al. Conhecimento sobre HIV/aids e estabelecimento de parcerias sexuais entre usuários do Hornet®. **Rev. Bras. Enf.**, v.71, n.4, 2018.



Revista Brasileira de Enfermagem - Decision on Manuscript ID REBEn-2017-0409.R1

R Revista Brasileira de Enfermagem para mim, assisteditorial.reben ↕ 6 de ago

06-Aug-2017

Dear Mr. Queiroz:

It is a pleasure to accept your manuscript entitled "Conhecimento sobre HIV/aids e estabelecimento de parcerias sexuais entre usuários do Hornet®" in its current form for publication in the Revista Brasileira de Enfermagem na n4 de 2018. The comments of the reviewer(s) who reviewed your manuscript are included at the foot of this letter.

Congratulations!!

Favor aguardar o contato do escritorio editorial para darmos continuidade ao processo de publicação

Att,
Dulce

Thank you for your fine contribution. On behalf of the Editors of the Revista Brasileira de Enfermagem, we look forward to your continued contributions to the Journal.

Sincerely,
Prof. Dulce Barbosa
Editor-in-Chief, Revista Brasileira de Enfermagem
editor2.reben@abennacional.org.br, dulce.barbosa@unifesp.br

A Responder a todos

Knowledge about HIV/AIDS and implications of establishing partnerships among Hornet® users

Conocimiento sobre el VIH/SIDA y sus implicaciones en el establecimiento de relaciones entre usuarios del Hornet

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ABSTRACT

Objective: To evaluate the knowledge of men, who have sex with men who use geolocation-based dating software, about HIV/AIDS, and the implications of establishing partnerships. **Methodology:** Descriptive study with 30 Hornet® users. The statements generated had statistical treatment in the IRaMuTeQ software, analyzed through the Descending Hierarchical Classification. **Results:** The sexual frequency in the last 30 days was 2.9 partners, of which 2.1 were found by the application, of which 63.3% reported having sex without condoms. There were four classes: Knowledge about HIV/AIDS prevention measures; PrEP/truvada as a measure of HIV/AIDS prevention; Risky behaviors in relation to HIV infection; Establishment of sexual partnerships through applications. **Conclusion:** Hornet users have insufficient knowledge about HIV prevention measures, especially when discarding the male condom. The relationships established through the application are

permeated by high individual vulnerability and behaviors that have potential exposure to the risk of HIV infection.

Descriptors: Male Homosexuality; HIV; Acquired Immunodeficiency Syndrome; Sexual Behavior; Mobile Applications.

RESUMEN

Objetivo: Evaluar el conocimiento que tienen los hombres que practican sexo con hombres, usuarios de la aplicación de encuentros con base en la geolocalización, sobre el VIH/SIDA y sus implicaciones en el establecimiento de relaciones. **Metodología:** Estudio descriptivo, con treinta usuarios del Hornet. Los relatos fueron tratados estadísticamente en *software* IRAMUTEQ y evaluados con la Clasificación Jerárquica Descendiente. **Resultados:** La frecuencia sexual en los últimos treinta días fue de 2,9 compañeros, siendo que 2,1 fueron conocidos mediante la aplicación, de los cuales 63,3% practicaron sexo sin condón. Se obtuvieron cuatro categorías: Conocimiento sobre las medidas de prevención del VIH/SIDA; PrEP/Truvada como medida de prevención del VIH/SIDA; Conductas vulnerables a infección por el VIH; Establecimiento de relaciones sexuales mediante las aplicaciones. **Conclusión:** Los usuarios del Hornet tienen conocimiento insuficiente sobre las medidas de prevención del VIH, especialmente cuando no utilizan condón masculino. Las relaciones establecidas mediante esta aplicación están construidas de alta vulnerabilidad individual y de conductas que exponen riesgos a infección por el VIH.

Palabras clave: Homosexualidad Masculina; VIH; Síndrome de Inmunodeficiencia Adquirida; Conducta Sexual; Aplicaciones Móviles.

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INTRODUCTION

When analyzing the HIV/AIDS situation worldwide it is noticeable that it is no longer a problem restricted to population groups but a pandemic that can affect, almost indiscriminately, everyone. Despite heterogeneity in the world population, recent studies indicate groups of key populations within this global epidemic, which includes men who have sex with men (MSM)⁽¹⁻⁴⁾.

The prevalence in this population is disproportionately higher than in the general population, and this can be attributed to specific vulnerabilities (sexual orientation, discrimination, stigma, difficulty in accessing education and health services) and certain sexual practices (insertive and receptive anal sex). The need to understand these vulnerabilities and to track the new behaviors justifies the importance of investigating the use of the Internet, especially mobile social networks, to establish sexual partnerships⁽²⁾.

Among the range of current resources offered by the Internet, the applications that are configured as social networks for relationships stand out, especially those focused exclusively on the MSM population. The sex facilitated by the help of these social media occurs, almost always, in a casual, fast, unscheduled, circumstantial way and on early age. Sometimes the partners dispense with the condom and there is high exchange of partners, since these relationships are casual, in addition to the possibilities of group sexual practices⁽²⁻⁵⁾.

Based on this and considering the absence of studies in Latin America that address the use of mobile applications for sexual encounters in the MSM population, this study aimed to evaluate the knowledge of men who have sex with men, using a geolocation-based dating application, regarding HIV/AIDS and its implications of partnering.

METHODOLOGY

Ethical Aspects

The study was approved by an ethics committee in human research and it rigorously followed all national and international ethical precepts. Aiming at anonymity, participants' names were encoded using the alphanumeric system (User 01).

Study type

This is a descriptive and exploratory research developed exclusively online in a geolocation-based dating application. The Hornet® is one of the most popular applications aimed at meeting men who have sex with men and it has around nine million users worldwide, with Brazil as one of its main consumer markets⁽⁶⁾.

Methodological procedures

The study was conducted with 30 MSM who are users of this application, selected through accidental sampling. Thus, MSM that were online at the time of collection were contemplated. For recruitment, a modified time-location sampling (TLS) technique⁽⁷⁾ was adapted to virtual reality, which allowed the development of a user sampling chart.

To be included in the research, the participants should meet the following inclusion criteria: age equal to or greater than 18, living in Teresina, Piauí, Brazil, or Ribeirão Preto, São Paulo, Brazil; having an active account in the application and being online at the time of collection, in addition to filling out the "Know Your Status" (KYS) section, available exclusively in this application. The choice of the two cities was defined in order to limit the sampling chart of participants, due to the large number of users in Brazil. In addition, both cities have a similar population in terms of the number of inhabitants and the young adult population.

Collection and organization of data

The data collection was provided by the TLS technique modified for virtual reality, in order to enable the simultaneous collection in the two cities without the displacement of the researchers, who used their own application settings to change their geographical position and allocate the users that wanted access, by city at the desired moment.

In the data collection, the Computer-Assisted Interview technique (CASI)⁽⁸⁾ was used, in which subjects approached through the application itself were invited to answer the study questions. Participants were presented to the research objectives and, after consent, were invited to answer the questions, which included: sociodemographic data, knowledge about HIV, forms of prevention, sexual behaviors and use of the application. The collection was conducted by two male researchers, older than 18, with expertise in the studied subject and who registered in the application to have access to the users, using a public profile.

The first online users who registered, in their profile, the current serological status for HIV/AIDS were approached. When the participant expressed disinterest in the research, the researchers moved on to the next user.

At the end of the interview, the users were asked if they had any questions about the subject and all were immediately answered by the researchers as well as conceptual misconceptions reported in their statements. When it was necessary, the researchers sent the addresses of the Testing and Counseling Centers of the city where the participant resided.

Data analysis

The users' reports were grouped in a corpus, with statistical treatment by the software IRaMuTeQ (acronym of *Interface of R pour les Analyses Multidimensionnelles de Textes et de Questionnaires*)⁽⁹⁾. This software uses statements to perform sophisticated lexical analyses and it

has been highlighted in qualitative researches in the health area⁽¹⁰⁻¹¹⁾. The authors emphasize that the use of software is not an absolute data analysis method, but a procedural tool that facilitates the analysis. Thus, the researcher is responsible for interpretation and conclusion based on their view of the findings⁽¹²⁾.

The data obtained were analyzed based on the Descending Hierarchical Classification (DHC)⁽⁹⁾, according to which the texts are arranged considering their respective vocabularies, whose set is divided by the frequency of the reduced forms. This classification enabled the researchers to obtain classes of segments of text with vocabulary that is similar to each other and at the same time different from the segments of text of the other classes. The DHC result was presented in a dendrogram.

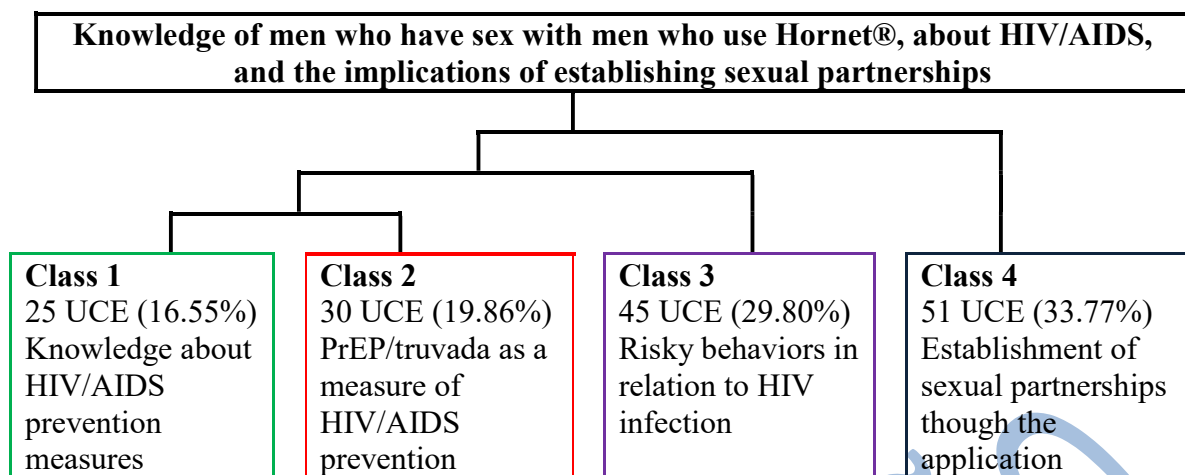
RESULTS

In this study, the young-adult age group corresponded to the majority of the participants (71.3%), with ages between 18 and 25, with secondary education (52.3%) and without own income (67.5%). Still, 90% of the participants reported not being in a relationship at the time and 83.3% identified themselves as homosexuals. All participants (100%) reported using other dating applications, in addition to Hornet®.

The mean of sexual intercourses in the last 30 days was 2.9 (minimum: 01, maximum: 16), of which 2.1 were arranged through Hornet®. Also, the distribution of the means by city was of 3.4 and 2.4 among the users in Ribeirão Preto (SP) and Teresina (PI), respectively. Still, 63.3% of the participants reported sex without condoms in the last 30 days and, although all of them reported knowing their serological status, only 46.6% had had a confirmatory test.

Regarding the participants' statements, through IRaMuTeQ, the separation of the *corpus* was recognized in 151 Elementary Context Units (UCE), from 30 Initial Context Units (UCI). There were 8,166 occurrences, using 71.6% of the initial *corpus*. Based on the Descending Hierarchical Classification the textual domains were identified and analyzed. From the identification of the most significant words (chi-square values) and interpretation of the meanings attributed to them, the collective construct was grouped, according to their respective meanings, into classes, shown in Figure 1.

During processing, the *corpus* underwent an initial partition resulting in two subgroups, related to knowledge about HIV/AIDS (classes 1 and 2), and vulnerabilities and sexual behaviors that facilitate exposure to HIV through Hornet® (class 3). Class 4 originated from a second partition, encompassing the others and it is related to the establishment of sexual partnerships through the application.



Note: PrEP – Pre-exposure Prophylaxis; UCE – Elementary Context Units

Figure 1 – Thematic structure of knowledge-related content of men who have sex with men through Hornet®, regarding HIV/AIDS and the implications of the establishment of sexual partnerships

Class 1: Knowledge about HIV/AIDS prevention measures

The content of this class is related to knowledge about HIV/AIDS prevention. The words grouped in it portray the low knowledge of the participants concerning the subject, as it is limited and sometimes wrong. This knowledge does not seem to have accompanied the technological advances in the area, limiting itself to the male condom.

Basically, I wear a condom. (User 12)

There is the condom, and a few gels that you place inside the condom to kill the virus, but I've never tested them. (User 23)

For women, there are a lot of things, but for men, there aren't so many options, just the condom. (User 30)

The low percentage of terms attributed to this class by the software is mainly due to the low variety of different words in the participants' statements, reflecting the lack of deepening on the catalogued biomedical forms of HIV/AIDS prevention.

Class 2: PrEP/truvada as a measure of HIV/AIDS prevention

This class is closely related to the former one (class 1). The subjects attempted to list other biomedical forms of HIV/AIDS prevention, which leads them to discuss PrEP. However, the discussion about PrEP was previously stimulated by the researcher seeking to sensitize the participants to the subject and, thus, to seek representations about this object. The statements, however, evidenced the difficulty of the users in listing forms of protection beyond the male condom.

Is PrEP the same thing as truvada? It is a medicine that porn actors use to have bareback sex? (User 01)

To be honest, I've never heard of this [PrEP]; is it a medicine? (User 12)

Despite the stimulus, most of the participants' statements contained misconceptions regarding the subject. In the following statements, PrEP is confused with the post-exposure prophylaxis (PEP) which is already consolidated and implemented in Brazil.

PrEP is a medicine that you take after a risky sexual intercourse, in order to decrease the chances of contracting the HIV virus and, thus, not getting infected. (User 22)

PrEP is that medicine you take for about 30 days after you are exposed to a risky situation? I've even taken it before. (User 04)

If I'm not wrong, it is a medicine for accidents? When something goes wrong, like a ripped condom, sexual assault, this kind of things. (User 07)

Little knowledge has a high potential to expose these subjects to risky situations, since it makes them vulnerable, with limited options for protection and negotiation of safe sex practices. HIV prevention measures have been limited to physical barriers that, when unavailable, facilitate unprotected sex, by the absence of another form of protection.

Class 3: Vulnerable behaviors in relation to HIV infection

The contents seized in this class relate to the behaviors and individual vulnerability of the users of the application, mainly due to the use of the application as a tool to obtain sexual partnerships.

The interclass relation is notorious, since the lack of knowledge about the prevention measures, evidenced in the previous classes (1 and 2), can potentialize situations of vulnerability, while the combination of biomedical forms of protection could facilitate protection.

Among risky behaviors, the high exchange of sexual partners, unprotected anal sex (bareback), lack of knowledge about the serological status, use of psychoactive substances during sexual intercourse and group sex are highlighted.

I had five partners this week... so, in the last 30 days, it was about 16, I think... (User 14)

I had relations with my boyfriend, and about 4 others... usually it is the "quick-fuck"... We have sex and we only call the guy again if he performed well. (User 12)

I had intercourse with ten guys... but that doesn't mean I had sex ten times, you know? It happened more with the same guy. (User 03)

I only have condomless sex with my boyfriend, it is always "bareback," even if it is a threesome. (User 08)

No... I had condomless sex only once when I had drunk and smoked pot. It happened with two guys who had also smoked pot, so it was quite intense... it was in his house. (User 10)

I met all of them through the application, it is like a menu from a restaurant, it has what you want, on any day you want it. (User 17)

Although the high exchange of sexual partners, unprotected anal sex and group sex are frequent practices among the participants of the research, HIV testing is not. Some of them do not know their serological status, while other users do not have a regular testing frequency.

No... I've never been tested, but I don't have condomless sex, only oral sex. (User 11)

No... but I think I'm negative, because my boyfriend is always tested... since he doesn't have it, I don't think I have it either, because I only have sex with him. (User 09)

I had condomless sex sometimes when I was in a relationship with three people. I wore a condom with the girl more regularly because she could get pregnant... (User 23)

Condomless? I do it only with guys, with girls, I'm afraid they are going to get pregnant. I'm afraid of it, I don't want to run this risk... (User 19)

I only got tested when I donated blood, but, when I say I have sex with other guys, the lady doesn't let me donate blood; so I stopped donating and getting tested. (User 27)

Class 4: Establishment of sexual partnerships through the application

Little knowledge about HIV prevention measures directly influences the establishment of sexual partnerships through the application. In this environment, users adapt to the “search system” based on practicality, speed, little dialogue, exchange of intimate photos and fast sexual decisions, providing greater exposure to risky situations.

[What I look for in the application is] someone nice to have fun with, and see what happens. (User 29)

[What I look for in the application is] someone hot to enjoy the night. I don't want relationships, no, I only want to have fun, really. (User 14)

Sex! I think everybody is looking for sex in there. Some people talk about friendship, but if the person is in shape and has a nice face, it is sex, really. (User 10)

Thus, the establishment of partnerships is a product of the particular characteristics that permeate relations through the application, that are extremely based on the physical-sexual interest, which does not allow for a negotiation that impairs the image of the body that is displayed and offered to the others.

[...] in Hornet® it is very fast, you don't have time to look for these things, you see the face, some nudes and then you arrange it, preferably, for the same day. (User 24)

When you meet someone, you are not very influenced, because this is the kind of thing that ruins the mood, to talk about diseases... so, nobody is going to ask about it. (User 14)

When the researchers asked about the importance of information about prevention measures in the applications, about knowing the partner's serological status prior to sex or the use of PrEP as an additional HIV protection measure, the users issued widely divergent opinions. However, most of them seemed resolute about the ineffectiveness of such measures due to the characteristics of the relationships in the application.

I believe that people are not very familiar with the means of HIV prophylaxis. So the risk in the Hornet is very high, because it is very used for sex without commitment, just to satisfy one's desire... (User 02)

No, that would be something else! I would not stop fucking a pretty guy because he's on PrEP... if he has HIV and uses [PrEP], then I'd think about investigating and analyzing it. (User 27)

DISCUSSION

The users of Hornet have insufficient knowledge about HIV/AIDS prevention measures, especially when the male condom is discarded. The relationships established by the application are permeated by high individual vulnerability and behaviors that have a potential to expose the users to the HIV infection, potentialized by the particular characteristics that permeate the relationships originated from the application.

The use of geo-social dating applications as facilitator and mediator of sexual encounters has been gradually reported in the literature, explored predominantly in developed countries. Most of them address issues related to describing users' profiles or risky behaviors. In this sense, this research is a pioneer in addressing the description of this profile alongside the identification of risky behaviors in relation to HIV infection and its influence in the establishment of partnerships in a developing country.

The predominant age group of young and young-adults has been associated with a higher frequency of use of the dating applications. This intensified use of the applications generates greater sex-seeking, more sexual partners⁽¹³⁻¹⁵⁾, and higher chances of acquiring sexually transmitted infections (STIs)⁽¹³⁻¹⁸⁾. The reasons for this phenomenon seem to be related to the fact that these young people relate the applications to the ideals of practicality, anonymity and convenience, thus, approaching other partners with more security and avoiding possible stigmas and prejudices, managing and revealing their sexual identity in a personalized way.

The ability to manage aspects related to sexuality, provided by application features such as the display of intimate photos and sexual preferences, coupled with the high efficiency of finding the "ideal partner," explains the fact that most participants use the applications purely for sexual purposes.

Expressing sexual preferences and filtering other potential partners from the applications enables the users to pursue different sexual activities (bisexual or group sex, bareback and orgies) without necessarily entailing emotional involvement with the participants. The encounters are usually unique and may include the fixed partner, suggesting that MSM users of the application view their sexual and affective needs differently^(5,13).

Furthermore, the analogy between in-app profiles and meals on a menu can be understood as a reflection of how quick these relationships are, in which users see their peers objectifying them as something to be consumed. This finding regarding the high exchange of sexual partners in the last month corroborates this idea and is reported in other studies that approached this object of research^(17,19).

Analyzing knowledge about HIV/AIDS prevention among MSM Hornet users is not common in the literature. In this study, this knowledge was extremely limited and restricted to the male condom. The connection of HIV protection limited to the presence of a physical barrier, which

can be used only during sex, ignores prevention options that can be used before (PrEP) or after the sexual intercourse (PEP) and significantly reduces the negotiation options when condom use is not feasible or preferable⁽¹⁴⁻¹⁷⁾.

The Brazilian health policies, regarding the prevention of sexually transmitted infections, mainly aimed at the LGBT population, are slowly advancing. They are still limited and focused almost exclusively on a heterosexual model of condom use, despite the existing behavioral or pharmacological options^(17,19-21).

As demonstrated in the statements, the sexual encounters facilitated by the application are quickly initiated and concluded, without time for preparation, which can lead to the inconsistent use of the condom. Among current biomedical prevention strategies against HIV infection, PrEP has been highlighted due to its high efficacy presented in clinical trials⁽²²⁻²³⁾, and it is particularly recommended for MSM in situations of vulnerability. Although its use has not yet been regularized in Brazil, a study⁽²⁴⁾ already indicates the use of Truvada (commercial name of the drug), through the purchase of other countries.

In a social context, Brazil is marked by the contrast between the image of a tolerant and open society, coupled with growing manifestations of prejudices and discrimination against homosexuals as well as the censorship of their practices and affective-sexual preferences⁽²⁵⁾. This limitation against the expression of sexuality in its multiplicity directly affects the construction of knowledge about sexual health, especially the prevention of STIs. Thus, the exchange of experiences and doubts about sexual practices, especially among younger individuals, is impaired. They end up reproducing, in homosexual practices, knowledge about prevention, built for heterosexual practices^(19,21,25).

The lack of risk perception and/or misinformation about the importance of the knowledge about the serological condition directly influences the willingness to test for STIs such as HIV/AIDS. The literature provides evidence that young MSM who have recently been exposed to anal sex without a condom are more likely to be tested. However, recognition of the situation of exposure is crucial for this to occur. Therefore, users should be properly sensitized and welcomed⁽²⁶⁾.

Insufficient or misleading knowledge about HIV prevention measures, in addition to potentializing situations of exposure due to the low perception of risk, directly influences the establishment of partnerships. Once in the applications, users are likely to follow and replicate their trends. The establishment of partnerships is marked by high exchange and sometimes multiplicity of partners, unprotected anal sex, use of psychoactive substance during the sexual intercourse and group sex^(5,13,16,27).

As they seize social spaces, LGBT people are breaking free from the bonds and social norms imposed on the model of heterosexual relationship, creating and molding norms that are more adequate to their experiences, needs and desires. Understanding these particularities is necessary for the construction of a comprehensive and better developed care. It is important to understand how the details and specificities described affect the practices and behaviors of the LGBT community, in order to propose viable measures of protection and prevention focused on this reality^(20,27-29).

Study limitations

The main limitation of this research is the fact that the results are based on self-reported information, especially regarding HIV testing and HIV status. In addition, conducting interviews that require a lot of subjectivity at a distance can bring compromise, as long as they are not properly conducted. However, the researchers responsible for data collection have expertise in this type of approach aimed at this population.

The researchers believe that using mobile applications as a tool for sampling allocation is an innovative, fast and inexpensive tool. Hence, access to “difficult” groups, such as the one studied, is less expensive for researchers as well as for participants. Furthermore, research involving diseases, such as HIV/AIDS, or behaviors that are susceptible to judgment, criticism or social stigma tend to have higher reliability when performed by the Computer-Assisted Interview technique^(8,30).

Contributions to the fields of nursing, health or public policies

The scenario presented in this study exposes a panorama, so far unprecedented in Brazil, which involves the interface of new communication technologies and vulnerability to HIV infection. Describing this reality from a Brazilian perspective puts the country in dialogue with international science. Non-heterosexual populations are notoriously discriminated and receive less attention in scientific studies; bringing details about their behaviors, knowledge and attitudes empowers professionals and strengthens public policies that can actually impact the lives of these subjects.

The researchers believe that further research, especially comparative, is necessary, since this study describes users of a specific application (establishing partnerships), which does not enable one to generalize the results for the entire population of men who have sex with men in Brazil.

CONCLUSION

Men who have sex with men and use dating software have high risky behaviors for HIV infection, which is associated with high individual vulnerability and low knowledge of HIV/AIDS prevention measures, in particular Pre-exposure Prophylaxis (PrEP). The relationships originated from the application are permeated by these characteristics that potentialize the possibility of

acquiring the virus. These characteristics expose them to a higher risk of acquiring HIV and other STIs and place them as a key population in controlling the epidemic in Brazil.

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VERSÃO TRADUZIDA

5 CONCLUSION

In our study men who have sex with men and use dating applications have a specific vulnerability to HIV, related mainly to the individual domain, composed of factors such as individual vulnerability, low knowledge about HIV/aids prevention measures, high average numbers of partners are ensured by recurrent use of applications, which allow high frequency of recent sex (last few months) and lifetime sex.

Sexual partnerships originated and mediated from application were characterized, in general, as: occasional, immediate, unprotected, with drugs, and with no information about the HIV status of partners.

The relationships arising from the application are permeated by such features that enhance the vulnerability of MSM for exposure to the virus. Nevertheless, the virtual environment presents unique prevention opportunities for its users: knowledge and disclosure of serological status, possibility of combining strategic positioning and the use of prevention methods (condom, PrEP or undetectable serology) prior to the sexual encounter.

In Brazil, despite the increase in the number of cases in this population, little is seen about the implementation of new strategies for prevention, especially PrEP, a technology of proven efficacy and indicated for vulnerable populations. There is a need for a joint discussion of society, the scientific community and social movements to demand actions that minimize the burden of infection in these populations.

These actions should begin in the most basic areas of prevention, highlighting the role of nurses in guiding and elaborating prevention and health education strategies, especially among young individuals and in the context of basic health care.

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APPENDIX

APPENDIX A - Free and Informed Consent Form

Vulnerabilidades de homens que fazem sexo com homens ao HIV usuários de aplicativos geossociais para encontros

Obrigado por ter acessado o link do nosso instrumento. Esse estudo tem como objetivo avaliar comportamentos de homens que fazem sexo com homens usuários de aplicativos geossociais para encontros.

As questões são fechadas e, por isso, não é difícil ou demorado respondê-lo. É importante que você responda as questões na ordem, sem pular nenhuma, pois isso pode prejudicar os resultados.

Você terá maiores detalhes no Termo de Consentimento Livre e Esclarecido que é apresentado a seguir.

Agradecemos o apoio. Sua experiência vai ajudar a compreender aspectos importantes acerca do comportamentos de homens que fazem sexo com homens, assim como suas vulnerabilidades para o HIV e outras IST, melhorando assim políticas e práticas de prevenção.

***Obrigatório**

Universidades relacionadas com a pesquisa

Escola de Enfermagem da Universidade de Ribeirão Preto, USP (EERP-USP).

TERMO DE CONSENTIMENTO LIVRE E ESCLARECIDO

Você pode solicitar uma via impressa do TCLE ou uma cópia em PDF do mesmo. Basta nos contatar pelo email ao final.

Leia com Atenção:

Você está sendo convidado a participar do projeto de pesquisa de Artur Acelino Francisco Luz Nunes Queiroz, mestrando da Escola de Enfermagem da Universidade de Ribeirão Preto, USP (EERP-USP), que propõem a pesquisa: " Vulnerabilidades de homens que fazem sexo com homens ao HIV usuários de aplicativos geossociais para encontros". O objetivo geral é analisar as vulnerabilidades de homens que fazem sexo com homens, usuários de aplicativos geossociais de encontro, à infecção por HIV.

A pesquisa trará benefícios indiretos aos usuários de aplicativos, uma vez que seus resultados poderão ser utilizados para compreender melhor suas ações, fomentar melhores práticas para diminuição de suas vulnerabilidades, assim como estabelecer subsídios para maiores estudos nesta realidade. O desenvolvimento deste estudo implicará em riscos mínimos considerando

que o procedimento de coleta de dados se fará por meio de instrumentos que serão respondidos pelo participante da pesquisa, sem a presença de um pesquisador. Entende-se que ainda assim o participante que poderá se sentir constrangido ao respondê-lo, Assim, para evitar esse risco informamos que os participantes poderão desvincular-se do estudo se assim acharem necessário, e que nenhuma forma de identificação pessoal será vinculada á suas respostas.



Você está sendo convidado a participar do estudo através do preenchimento de um questionário abordando a caracterização dos enfermeiros, seu contexto de trabalho, a sensibilidade moral e o sofrimento moral, com duração aproximada de 5 minutos.

Sinta-se totalmente livre em participar e só depois de entender bem o estudo, decida a sua participação. Você pode decidir retirar-se do estudo a qualquer momento e ter esclarecimentos sempre que julgar necessário. Em caso de dúvida ou para conhecimento posterior dos resultados, pode entrar em contato com as pesquisadoras, Artur Acelino Francisco Luz Nunes Queiroz, telefone (86) 999190480, email: arturqueiroz@usp.br.

Este Comitê de Ética tem a finalidade de garantir a manutenção dos direitos humanos, protegendo eticamente os participantes de pesquisas, pois avalia as pesquisas em todas as etapas dos estudos que envolve seres humanos, desde a elaboração do projeto até o relatório final. Ressaltamos que o desenvolvimento da presente pesquisa foi aprovado pelo CEP-EERP. ESCOLA DE ENFERMAGEM DE RIBEIRÃO PRETO- USP Comitê de Ética e Pesquisa – Avenida Bandeirantes, 3900 Tel : (16)3315 9197E-mail cep@eerp.usp.br Horário de atendimento: Segunda a Sexta-feira das 8 às 17 horas.

ATTACHMENT

ATTACHMENT A

Approval of the Research Ethics Committee of the University of São Paulo at Ribeirão Preto
College of Nursing

UNIVERSIDADE DE SÃO PAULO
ESCOLA DE ENFERMAGEM DE RIBEIRÃO PRETO

Curso: Graduação em ENFERMAGEM para a
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Ofício CEP-EERP/USP nº 025/2017, de 16.02.2017

Prezada Senhora,


Comunicamos que o projeto de pesquisa abaixo especificado foi analisado e considerado **aprovado "ad referendum"** pelo Comitê de Ética em Pesquisa da Escola de Enfermagem de Ribeirão Preto da Universidade de São Paulo (CEP-EERP/USP) em 15 de fevereiro de 2017.

Protocolo CAAE: 62603816.0.0000.5393

Projeto: Vulnerabilidades de homens que fazem sexo com homens ao HIV usuários de aplicativos geossociais para encontros no Nordeste brasileiro

Pesquisadores: Artur Acelino Francisco Luz Nunes Queiroz
Renata Karina Reis (orientadora)

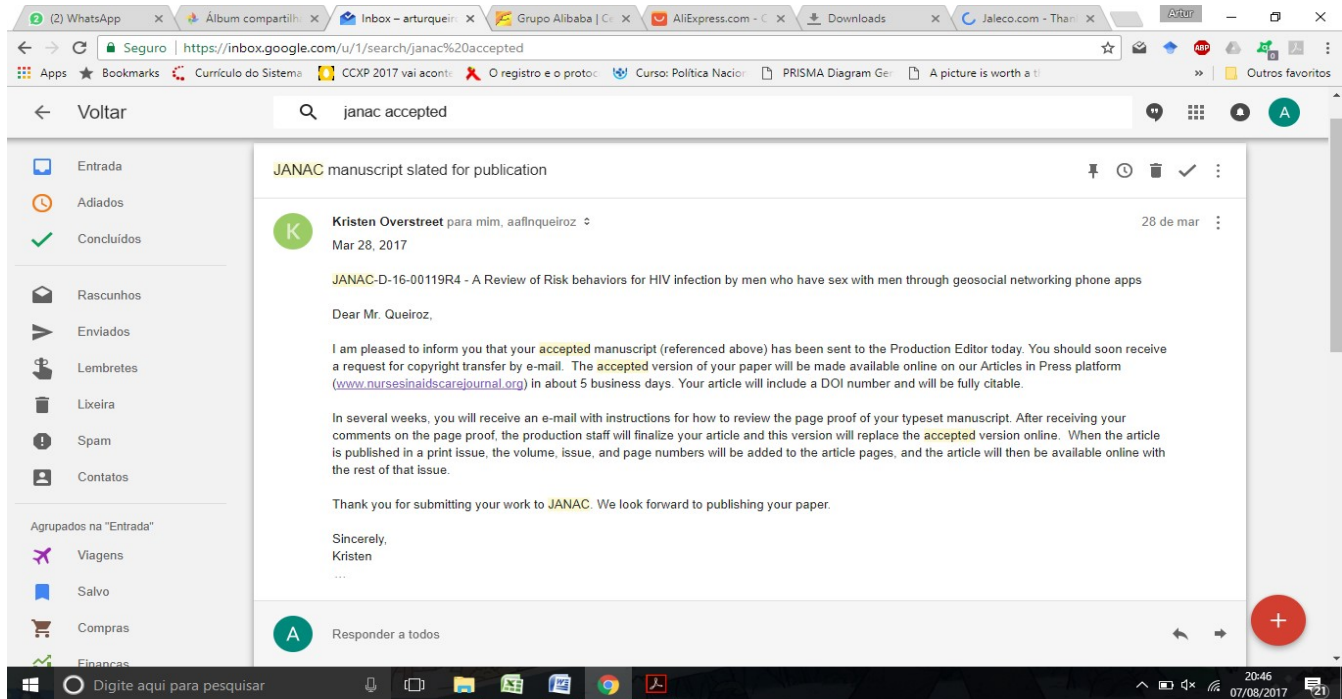
Em atendimento à Resolução 466/12, deverá ser encaminhado ao CEP o relatório final da pesquisa e a publicação de seus resultados, para acompanhamento, bem como comunicada qualquer intercorrência ou a sua interrupção.

Atenciosamente,

Prof.ª Dra. Angelita Maria Stabile
Coordenadora do CEP-EERP/USP

Ilma. Sra.
Prof.ª Dra. Renata Karina Reis
Departamento de Enfermagem Geral e Especializada
Escola de Enfermagem de Ribeirão Preto - USP

ATTACHMENT B

Acceptance Proof by the Association of Nurses in AIDS Care



ATTACHMENT C

Acceptance Proof by Revista Brasileira de Enfermagem



Revista Brasileira de Enfermagem 19:25
para mim, assisteditorial.reben



06-Aug-2017

Dear Mr. Queiroz:

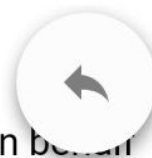
It is a pleasure to accept your manuscript entitled "Conhecimento sobre HIV/aids e estabelecimento de parcerias sexuais entre usuários do Hornet®" in its current form for publication in the Revista Brasileira de Enfermagem na n4 de 2018. The comments of the reviewer(s) who reviewed your manuscript are included at the foot of this letter.

Congratulations!!

Favor aguardar o contato do escritorio editorial para darmos continuidade ao processo de publicação

Att,

Dulce



Thank you for your fine contribution. On behalf
of the Editors of the Revista Brasileira de