



The Use of Social Media in HIV Prevention

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The overall aim of this study is to address the lack of awareness of health care professionals working in infection control on social media platforms and social media strategies in HIV prevention. The human immunodeficiency virus (HIV) has been considered for a long time as the leading global health issue that affects physical, mental, sexual, and financial well-being.

An integrative literature review was conducted with the aim of identifying various social media platforms, exploring social media strategies, and identifying the barriers to using social media in HIV prevention. Data search was performed in October 2021 using three databases. After the database search, there were 3484 potentially relevant articles; 17 of which were selected based on different parameters included in the inclusion and exclusion criteria. Various quality assessment tools were used to ensure the quality of the identified references.

The literature review indicates that different government and non-governmental agencies have come up with different strategies to comprehensively address and implement HIV prevention intervention. However, with the limitations of geographic locations, funding, and other resources, health information and interventions seldom reach individuals, who belong to the HIV high-risk group. New technologies such as social media platforms, are cost-effective, practical, and easily accessible globally. The reviewed literature included cases where social media platforms and different strategies were used in HIV prevention as a method of ensuring participation, awareness, and engagement.

The literature review results show that social media is undoubtedly an effective tool in health promotion. For some, social media platforms could be the next breakthrough in healthcare to maximise its purpose positively. Nonetheless, there are different barriers and challenges in the implementation of social media in HIV prevention. Therefore, it is recommended that continuous innovation combined with clear and structured policies address the challenges.

Keywords: social media, social media platforms, HIV prevention, HIV prevention strategies

Table of Contents

1	Introduction	6
2	Human immunodeficiency virus definitions	7
2.1	HIV and its Stages.....	8
2.2	HIV origins	8
2.3	HIV prevention strategies.....	9
2.3.1	Injecting drugs	10
2.3.2	Condom Use	10
2.3.3	Pre-exposure prophylaxis (PrEP) use	10
3	Social Media in HIV prevention.....	11
3.1	Social media definition and platforms	11
3.2	Social media and health literacy	12
3.3	Social media and HIV.....	12
4	The aim, objectives and research questions of integrated literature review	13
5	Data and methods	14
5.1	Integrated literature review	14
5.2	PICOTT model	16
5.3	Inclusion and exclusion criteria.....	17
5.4	Data search process and review	18
5.5	Quality assessment	19
5.6	Data analysis	20
6	Results.....	21
6.1	Social media used in HIV prevention	22
6.2	Different social media strategies in HIV prevention	25
6.3	Barriers in the implementation of social media in HIV prevention.....	29
7	Discussion	29
7.1	Strengths and limitations	32
7.2	Ethical considerations.....	32
7.3	Recommendation	33
8	Conclusion	34
	References	35
	Figures.....	40
	Tables.....	40
	Appendices.....	41

1 Introduction

The human immunodeficiency virus (HIV) is considered the leading major global health issue. According to World Health Organization or WHO (2020), more than 34.7 million individuals are infected with the virus worldwide. There is a mortality of 480,000 to 1 million HIV-related causes and about 2.1 million newly infected in 2020. (WHO 2020.) In addition, there were 3.9 million young people from ages 15 to 24 years old living with HIV in 2017 (UNAIDS 2019). About 1600 new HIV cases among young adults worldwide and death every 10 minutes due to HIV-related illness. High risk for HIV infection is the young key population, including gay men and other men who have sex with men (MSM), bisexual people, transgender people, sex workers, and drug users. (UNAIDS 2018.)

HIV invades the immune system and destroys immune cells that are relevant body's natural defence against diseases (National Health Services 2021). According to the Centers for Disease Control and Prevention or CDC (2021), it is a life-threatening illness, especially if left untreated and may lead to AIDS (acquired immunodeficiency syndrome).

Recent findings show that risks of HIV transmission compared with the general population, female sex workers and drug users are 13 and 21 times more, respectively. Meanwhile, gay men and other men who have sex with men have a 27 times higher chance of acquiring the virus than the general population. (UNAIDS 2017.)

Experts and scientists did countless quests and experiments to find absolute HIV cure or HIV prevention. Several promising drugs were produced; however, none of these drugs can attain the complete eradication of the virus. HIV vaccine prevention still needs major developmental factors to achieve its effectiveness fully. A residual immune dysregulation concerning chronic immune activation and B and T cell subsets insufficient restoration are some of the challenges that are still unmet that commonly cause morbidity that may later be accounted to increase risk of death rate in the immunocompromised patient. The queries in the development of a vaccine for HIV prevention has been a frustration to many. However, these attempts had opened new hope in the immunization strategies that target the critical viral products linked in virus transmission, activation and maintenance that soon may lead to the new context of HIV cure and future virus eradication. (Ensoli et al. 2014.)

The need for comprehensive and functional sexual education, including HIV awareness, is highly suggested. There is no absolute and effective treatment for HIV. Once individuals acquire HIV, they will have it for the rest of their life. (CDC 2021.)

WHO came up with consolidated HIV prevention guidelines as a valuable tool for public health. Right-based, evidence-informed and community own programmes were included to focus on the needs of individuals and communities. In addition, WHO established different HIV programmes combined with other sexually transmitted diseases infection prevention that is believed to strengthen the testing capacity. Condom use, pre-exposure prophylaxis (PrEP) and voluntary medical male circumcision (VMMC), were also emphasized in the guideline. (WHO 2021.)

In addition to WHO prevention guidelines, the United Nations Population Fund (UNFPA) 2020 came up with The HIV Prevention 2020 Road Map to scale down HIV infections by 75% by 2020. The roadmap concentrated on five key pillars that associate prevention for young girls, young women and their partners, combination prevention for key populations, condom use, voluntary male medical circumcision and sexual health services for boys and men and pre-exposure prophylaxis (PrEP) use. (UNFPA 2020.)

There is currently about an 11% increase in newly infected and HIV-related mortality during Coronavirus (COVID19) pandemic in the United States over 12 months. The interruption in HIV services such as reduced HIV testing, condom use, pre-exposure prophylaxis (PrEP) and antiretroviral therapy (ART) were the causes of the increase. (Mitchell et al. 2021.)

Even though the government and other agencies set different relevant programmes for HIV prevention and HIV awareness, there are still barriers and challenges in implementing resources, financially and geography. However, social media is a powerful tool to fill those gaps as an effective tool in communication and interaction with people worldwide to address these challenges. It is potent and effective in health promotion as it may reach wide audiences and cost-effective tool. (Jane et al. 2018.)

The study's primary purpose is to increase awareness in HIV prevention using different social media platforms and online social media strategies. As part of Learning by Developing Projects in Global Health and Crisis Management studies, the study is designed to serve as a future reference, especially in infection prevention and control.

2 Human immunodeficiency virus definitions

According to WHO (2021), HIV is a disease that involves the body's immune system being attacked by white blood cells, commonly known as CD4 cells. CD4 cells weaken one's immunity against other infections such as tuberculosis, severe bacterial infections, and other diseases. It may soon reduce the strength of individuals to perform their functions and activities of daily living. Acquired immunodeficiency syndrome (AIDS) is considered the most advanced phase of HIV. AIDS is characterized as the accumulation and development of

different infections, certain cancers, and other severe chronic illnesses. It is crucial to have HIV testing to know ones' status. The government recommends that people with HIV access and be linked to antiretroviral treatment (ART). Monitoring a person with HIV using blood tests, health, and sexual behaviour can prevent HIV transmission. (WHO 2021; CDC 2021.)

2.1 HIV and stages

CDC (2021) stated the possible different manifestations of acquired HIV infections. Flu-like symptoms are expected within 2 to 4 weeks. In addition, other possible symptoms include fever, chills, rash, night sweats, mouth ulcers, swollen lymph nodes, sore throat, muscle aches and fatigue. Nevertheless, having these symptoms does not always mean having the infection because of the similarity of symptoms from other illnesses. Persons infected may also not get any symptoms or are asymptomatic. (WHO 2021; CDC 2021.)

With the availability of new technologies, HIV prevention medicine can decelerate the progress of the infection. If persons with HIV cannot get the proper treatment, they tend to progress into three stages. According to the National Institute of Health or NIH (2021), the following Stages are Stage 1, also known as Acute HIV Infection and a very contagious stage—the body's natural defense against infection that manifests flu-like symptoms.

Antigen/antibody tests or nucleic acid tests can diagnose acute HIV infection. Stage 2 is also known as Chronic HIV infection. Persons infected may manifest no signs and symptoms, but the virus is still active at deficient phase levels. At this phase, HIV can be transmittable, and at the later part, HIV blood, commonly known as viral load, increases as the CD4 cell count decreases. Stage 3 or acquired immunodeficiency syndrome (AIDS). Persons with AIDS have very severe or low immune systems as they are prone to severe diseases or other opportunistic infections. CD4 cell count drops below 200 cell/mm and may have a very high viral load that can be very infectious. (NIH 2021; CDC 2021.)

The practical and only way to learn if infected with HIV is to get tested. Awareness of ones' HIV status will be beneficial to make practical and sufficient management to prevent getting HIV.

2.2 HIV Origins

The origin of HIV in a human was believed to come from a Simian immunodeficiency virus or SIV that usually from infected blood of a type of chimpanzee in Central Africa. Some researchers find that the virus was transferred on since the later part of the 1800s. A few decades after, HIV gradually spread across Africa and then globally. (CDC 2021.)

HIV is a lentivirus that attacks the immune system. Studies stated HIV-1 came from the SIV strain found in chimpanzees, and HIV-2 is related to the SIV strain found in sooty mangabeys.

Researchers then proved chimpanzees were the source of HIV-1 that eventually passed to humans. The same scientists identified the connection between chimps who had eaten two miniature monkeys and got infected with two different strains of SIV that infected humans over time. One of the theories is that the virus came from a hunter who had eaten chimps. (Sharp & Hahn 2011.)

The primary verified case of HIV is from the blood sample taken of a man living in the Kihansa in the Democratic Republic of Congo in 1959. The country is known for having the most genetic variety of HIV strains globally. The spread of HIV is believed to be the cause of the growing sex trade around the place. (AVERT 2020).

In 1960, many Haitian professionals working in the Democratic Republic of Congo returned to Haiti and were blamed for the HIV epidemic. They faced racism and discrimination. In the 1980s, HIV was first recognised as a new health condition in the USA. Cases of rare diseases were reported among gay men in New York, such as Kaposi's Sarcoma and lung infections. By 1982 scientists realised the disease was spreading and soon named AIDS. In 1983, HIV was recognised at Pasteur Institute in France. The same year, the CDC grouped HIV high-risk individuals, including partners of people with AIDS, people who inject drugs, haemophiliacs, and recently been to Haiti. Panic and stigma were common, and soon people came up with a "4-H Club" at risk of AIDS: homosexuals, haemophiliacs, heroin addicts and Haitians. (Sharp & Hahn 2011; AVERT 2020.)

2.3 HIV prevention strategies

National Health System or NHS (2021) stated HIV as a long-term condition and need consistent contact with the healthcare team. Having good communication and relationship with the healthcare team would make it easier to address issues and concerns. As part of the NHS programme to HIV, people are seen by trained specialists. (NHS 2021.)

WHO came up with five strategic guidelines focused on the "Global health sector strategy on HIV for 2016-2021", as endorsed by the Sixty-Ninth World Health Assembly. The following are 1) Information for focused action 2) Interventions for impact 3) Delivering for equity 4) Financing for sustainability 5) Innovation for acceleration. (WHO 2021.)

UNAIDS, 2021 introduced strategies, programmes, target setting for 2025 and the resource needs and impact for 2020 to 2030. These guidelines will serve as a guideline in the AIDS response globally from 2021 to 2030. The target-setting process started in 2018 and is expected to finish by mid-2021. The strategy will mainly focus on six thematic groups: testing and treatment, primary prevention, social enablers, costs and resources, integration, and longer-term technologies. (UNAIDS 2021.)

2.3.1 Injecting drugs

The use of shared needles and syringes to inject drugs claimed to be one of the risk factors of getting HIV. In the US, 1 in 10 HIV infections is accountable for the use of shared needles. Out of 37,968 newly HIV diagnosed in the United States in 2018, 3,864 individuals belong to people who inject drugs (PWID). Moreover, 4,905 deaths were reported among PWID in the same year. The government came up with Syringe services programs (SSPs) that provide sterile syringes and needles and proper disposal. The programs aim to address substance misuse, HIV testing and link to HIV management and prevention. The strengthening and comprehensive syringe services programs are needed to support the people who belong to high risk continuously. (CDC 2021; UNAIDS 2021.)

According to Azim, Bontell and Strathdee (2015), women who inject drugs are susceptible to HIV infections because of unsafe injections and unprotected sex. In addition, they are most hidden affected by the disease as they are more discriminated and stigmatized. The study showed that few women sell sex for money and drugs. Moreover, women who inject drugs experience police harassment, fear, and judgmental healthcare providers that hinder them from accessing the health system. (Azim, Bontell & Strathdee 2015.)

2.3.2 Condom use

The proper way of condom use is a very effective method of HIV prevention. The combination of condom uses, and PrEP drugs can contribute more protection. The correct and consistent use of condoms can lead to lessening and minimizing the risk of HIV transmission. Different studies show the effectiveness of condoms when consistently used to serve as an impermeable barrier to HIV size particles and block and obstruct the contact among penis, partner's mucosa, and genital secretions. (CDC 2021.)

According to Bcheraoui et al. (2013), out of 824 sexually active participants, 526 claimed to use a condom from the last sexual intercourse. Many of them believed in the effectiveness of condom use in HIV and other sexually transmitted infections prevention. Dawn et al. (2015) agreed with the previous study and emphasized that condom use was 70% effective among MSM who had anal sex with an HIV-positive male partner compared with never used. Also, 16% of MSM claimed to use condoms during anal sex with male partners consistently.

2.3.3 Pre-exposure prophylaxis (PrEP) use

PrEP (pre-exposure prophylaxis) is an HIV prevention method using medication for people that belong to the sexual and drug-use risk group. At present, two drugs are available and approved in the market, the Truvada® and Descovy®. PrEP is believed to be an effective way to prevent HIV from sex by about 99% and 74% from injecting drugs. Experts claim to be safe

even though some people may experience different side effects such as diarrhoea, headache, stomach pain and fatigue that usually resolve over time. Trained doctors must properly prescribe these two medications. (CDC 2021.)

Fonner et al., (2016) stated that the use of PrEP was 70% effective than using a placebo. Researchers concluded that PrEP was a unique and potent approach against HIV infection with minimal side effects from the same study. The impact of PrEP in the population will be determined through adherence.

However, a more recent study conducted by Shuper et al. (2016) highlighted that non-adherence to PrEP may lead to HIV infections among MSM. There were contributing factors of poor compliance were alcohol intake, substance abuse and depression. In addition, out of 141 participants, high alcohol intake was the most common reason for non-adherence. An integrated strategy that will focus on alcohol and substance use into PrEP was suggested to promote compliance.

3 Social media in HIV prevention

3.1 Social media definition and platforms

Merriam-Webster (2021) defined social media as a form of sharing information, ideas, personal messages, and other content by using electronic communication tools such as social networking websites. Communities can also interact and communicate using the internet, computers, and mobile phones globally. (Cambridge Dictionary 2021). In addition, Kaplan and Haenlein (2010) social media allow online users to generate profiles using their personal information and invite friends to start connections and access created profiles.

Walsh (2021) stated and compared the top 10 social media sites and platforms available globally in 2021 based on monthly active users. According to the survey, Facebook still dominated the world for several years, followed by YouTube, WhatsApp, Instagram, Tiktok, Snapchat, Reddit, Pinterest, Twitter, and LinkedIn. In addition, Statista (2021) recognized the most popular social media platform online. Stated in their article that Facebook surpassed one billion registered accounts, reaching 2.85 billion active users. Facebook company affiliates include WhatsApp, Facebook Messenger, and Instagram. Chinese social media platforms such as QQ, WeChat and Douyin are currently penetrating the world market. 3.96 billion online active users are estimated by the year 2022. (Statista 2021.) These social media platforms are believed to educate and provide an avenue for health information dissemination that promote health, including HIV prevention. (Statista 2021.)

3.2 Social media and health literacy

Roberts, Callahan, and O’Leary (2017) stated that social media, most known as social networks, connect people or a group of people around similar content or topics of related interest. In addition, social media platforms provide the opportunity to interconnect different people globally. Most individuals gain their news and health information online. Social networks include Facebook, Twitter, Instagram, Linked In, YouTube, and more.

Social networks are a very influential mode of communication as they enable everyone to associate with personal relationships and conventional interests. It expeditiously activates individuals around the issues involved and gives relevant information. (O’Mara 2012.) Social media and health literacy are interconnected, especially in health promotion and prevention (Roberts, Callahan & O’Leary 2017).

WHO (2021) derived from Health Promotion Glossary dated 1998 health literacy is defined as applying all the knowledge, skills, and confidence into personal improvement and community health by creating change in personal and living conditions. Through improved health information access and effective use, empowerment takes place.

One factor in improving health literacy is proper identification of individuals in the community that influence their health, engage with the community action for health, and address health and health equity responsibilities to the government. Improving health literacy programmes are relevant elements based on the social, economic, and environmental ambition of the 2030 Agenda for Sustainable Development. (WHO 2021.)

O’Mara (2012) recognised the growing number of people continuously getting health information through social media. In addition, O’Mara also emphasised and suggested applying health literacy principles to improve health promotion that includes the following: knowing the audience, understanding the purpose of health messages, and creating social media messages to tailor to diverse populations. Tse et al. (2015) agreed with the previous study and stated that Facebook and YouTube were efficient tools for health literacy among adolescents.

3.3 Social media and HIV

Tso et al. (2015) stated that social media encourages safe sexual behaviours, effectively engages people and communities, and shares information about HIV prevention. Part of the evolvement of social media use is the increasing trend of accessibility to everyone.

Facebook is one of the most popular websites among people worldwide. According to Chen (2020), in the latest survey conducted by Sprout Social, Inc in the current year, 51% of Facebook users belong to the age group of 13 to 17. 76% of 18 to 24 years old and 84% of 25 to

30 years old use Facebook in the United States. Michel Sidibé, Executive Director of UNAIDS (2011), said that: “The potential of new technologies to re-energise the AIDS movement is clear. We need nothing less than an HIV prevention revolution, with social media and mobile technology at its core.”

Social media and the internet are accessible and popular tools among young people. It is also a cost-effective way to promote HIV prevention programs through instruments that are already on hand. Is social media a valuable tool in learning the community concerning HIV prevention? Techniques in the implementation, monitoring the development of interventions and producing relevant insights into HIV prevention are some of the advantages that social media can provide. (Tso et al. 2015.)

However, according to Verrinder (2007), social media mechanics are used to find sexual partners. Chatting with regards to sex, explicit photos, and communicating for sex are prevalent, among others. Social media has a positive impact on the community and has some barriers to maximizing its good benefits that are needed to be addressed.

4 The aim, objectives, and research questions of the Integrated literature review

This integrative literature review aims to increase the awareness of healthcare professionals in HIV prevention using social media.

The main study objective is to find out the use of social media in the prevention of HIV. The specific objectives are 1) to identify different social media used in HIV prevention, 2) to explore different social media strategies in HIV prevention and 3) to identify the barriers and challenges in using social media in HIV prevention.

The research questions are:

- 1) What are the social media used in HIV prevention?
- 2) What are the social media strategies used in HIV prevention?
- 3) What are the barriers and challenges in using social media in HIV prevention?

After identifying different social media platforms, strategies, and barriers and challenges in implementing social media in HIV prevention, recommendations will be formulated based on the references to provide evidence-based practice, especially to healthcare professionals.

5 Data and Methods

Topic and method selection began in June 2020. The author has a great interest in the topic and has been working as a Registered Nurse. The author knows infection control and has overseen assessing, administering medications, giving guidance and support to people living with HIV.

When this study was started, there was a surge of COVID-19 pandemic wherein the healthcare system focused on eradicating the virus. People living with HIV should be considered as people with comorbidities because of their deficient immune systems. The lack of instructions, guidance and awareness was seen during these times.

For instance, the Philippines had 176% growth of HIV incidence and was hailed as the fastest-growing HIV epidemic in the western Pacific in 2017. (DOH 2018). The shortcomings in the healthcare system, funding, support and guidelines for healthcare professionals and HIV patients' people are the current outmost challenge. The author wanted to take part in HIV prevention awareness in his home country and globally.

The research method for this study is an integrative literature review (ILR) because of the all-inclusive perspective of the topic using scientific-based evidence. PICOTT model was also used for the thesis process structure. The study was done mainly during the author's "leisure time" as part of Master's studies at Laurea University of Applied Sciences. The thesis was finalized in November 2021.

5.1 Integrative literature review

Integrative literature review (ILR) is the method that used in this study. ILR is an interesting form of research and the most frequently cited type of research article to scholars. The main reason for choosing the integrative literature review as a method for the study was that the ILR allows the relevant form of study that gives new knowledge about different HIV prevention-related topics by providing a review, critique and synthesising model literature in an integrated approach that provides new frameworks and perspectives on the topic. (Torraco 2016.)

It is relevant to critically review HIV prevention-related topics to guide future theoretical queries and identify disparities and inconsistencies of current studies. A profound and updated integrated approach is a suitable method because it can become a substantial component of evidence-based practice. (Whittemore & Knafl 2005.) According to King and He (2005), a descriptive review will also establish how information regarding the research topic affirms explicable sequence under the propositions, theories, methodologies, and findings.

Pare et al. (2015) agreed to the previous study, descriptive reviews adhere to methodological, efficient, and straightforward processes such as searching, screening, and classifying studies. It is also utilised to constitute a representative case of a larger group of released works.

ILR has numerous advantages to scholars, including evaluating the strength of scientific evidence, exploration of research methods, generation of research questions, identification of current studies, need for future research, theoretical or conceptual framework, and specific issues (Russell 2005). The discussion should contain how the literature was analysed to identify and categorise themes to verify the validity and authenticity. The method should be characterised in an adequate and detailed manner for readers to confirm their familiarity with the topic and for replication of other scholars and researchers. (Russell 2005.)

Based on Cooper's theoretical framework and Whittemore and Knafl, their study contains different methods used in ILR. Problem identification, literature search, data evaluation, data analysis and presentation. (Whittemore & Knafl 2005; Hopia, Latvala & Liimatainen 2016.) (Figure 1)

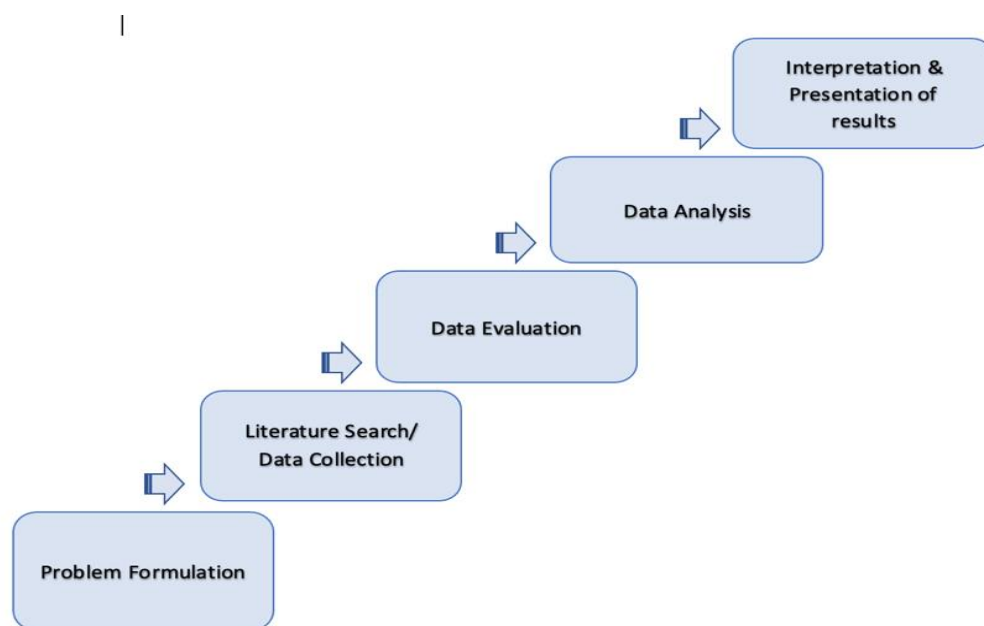


Figure 1: The five phases of integrative literature review based on Whittemore and Knafl, 2005, modified by the author

Firstly, the problem formulation phase suggests the description of variables and their relationship with other variables. The development of different concepts and operational

definitions occur as the review progresses (Russell 2005). Secondly, data collection or literature search comprises identifying target populations, sampling frame and evaluation, which involves a systematic search for all related topics. (Russell 2005; Whitemore & Knafel 2005, 552.) Thirdly, data evaluation shows the strength of relationships examined by individual studies using critical appraisal tools to ensure quality methodology. (Hopia, Latvala & Liimatainen 2016). Fourthly, data analysis is associated with finding patterns in samples and formulating conclusions about the population. Finally, interpretation and presentation contain analysis and judgement of the findings. (Russell 2005). The recent idea concerning the relevant topic may arise and may be helpful for practical purposes (Whitemore & Knafel 2005, 552).

5.2 PICOTT Model

According to Thabane et al. (2008), the achievement and success of a study process depend on how researchers can translate clinical problems into research questions. Moreover, the PICOTT model is an approach associated with a higher quality research tool as it provides structure in framing research questions. It is a tool that guides researchers in specifying research questions into the outcomes for later assessment. The identification of the research problem, methods previously used, interventions, formulating research questions, and methods used in this study were based on the PICOTT model. PICOTT model is provided in Table 1.

Problem	Lack of awareness of health care professionals working in infection control on social media platforms and social media strategies in HIV prevention.
Intervention	To identify different social media platforms, explore different social media strategies and identify the barriers in using social media in HIV prevention.
Comparison	Comparison of the use of different social media platforms and strategies in HIV-prevention
Outcome	Awareness of the effect of online social media platforms and different strategies that can address the challenges of health promotion in HIV prevention through social media.
Type of questions	1. What are the social media used in HIV prevention? 2. What are the social media strategies used in HIV prevention? 3. What are the barriers and challenges in using social media in HIV prevention?
Type of study	Integrative literature review (ILR)

Table 1: PICOTT Model

5.3 Inclusion and exclusion criteria

Inclusion and Exclusion criteria were determined before data search. All relevant studies were also examined to gather valuable resources. In addition, quality resource materials were considered, such as original peer-reviewed studies with different study designs. The study population are the people living with HIV. The year of the publication is 2011 to 2021. In addition, the grey literature will not be included to conduct a high-quality study. The publication language was limited to English. The inclusion and exclusion criteria are seen in Table 2.

INCLUSION CRITERIA	EXCLUSION CRITERIA
<ul style="list-style-type: none"> • Study population: people living with HIV • Intervention: health intervention/health promotion • Data type: original peer-reviewed studies including integrative literature review, systematic literature review, qualitative, quantitative, and mixed methods. • Publication language: English 	<ul style="list-style-type: none"> • Pro- gradu thesis, case reports and narrative literature reviews • Print ads, old magazines, textbooks, and newspapers • Past studies from 2011 backwards and duplicated articles • Other languages.

Table 2: Inclusion and Exclusion criteria

5.4 Data search process and review

The author solely did the research with the help and supervision of lead- thesis Principal Lecturer Teija- Kaisa Aholaakko and Information Specialist Aino Helariutta for data search. The data collection for the study was started in September 2021. Three databases were chosen for data search for the study PubMed, Cinahl and Google Scholar. (Figure 2)

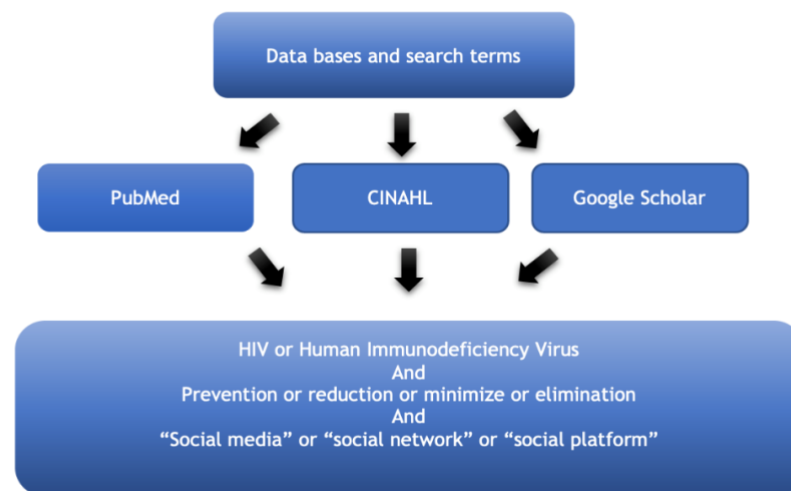


Figure 2: Data search from databases

The author made use of RefWorks software for the storage of all the references. In the initial stage, all duplicates were removed. Also, in the next stage, the title and study language were reviewed and screened. In the third stage, past studies from 2011 backwards were removed. In the fourth stage, suitable and relevant articles and references were chosen for full-text reviews. Lastly, references with full text were reviewed based on the inclusion and exclusion criteria. Critical appraisal tools were used for assessment tools development. Last week of October 2021, the relevant references were finalized and included.

5.5 Quality Assessment

Seventeen articles with a variety of designs were included. In this study, different assessment tools were used for different study designs. Using a variety of assessment tools help the authors to assess and record essential aspects in study methods, context, finding, analysis, and interpretations, and ensure quality and a better understanding of research (Higgins & Greene 2011, 187). The quality of the studies included in this integrative literature review was carefully assessed.

Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) tool was used in the study to assess observational studies. STROBE represents the international collaborations of different experts in research such as epidemiologists, methodologists, statisticians, journal editors and researchers in conducting observational studies. They provide valuable structures and recommendations for the betterment of the studies, most

especially the observational method research. (STROBE 2021.) The checklist (A) applied from STROBE was used to assess the quality of observational studies (Appendix 3).

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was used to assess the quality of systematic reviews identified in this study. PRISMA is a valuable tool that guides authors in improving and critically appraising different systematic analyses and meta-analyses. It is evidence-based and concentrated on evaluating the effects and application of interventions included in systematic reviews. (PRISMA 2021.) The checklist (B) applied from PRISMA was used to assess the quality of systematic review studies (Appendix 4).

Critical Appraisal (CASP) tool aid and guide researchers through the objective, analytical and evaluation process. Guidelines and checklists must contain a report or publication to establish that studies are clearly stated, completeness and transparency (Buccheri & Sharifi 2017). The author used the CASP tool checklist to assess qualitative studies. CASP checklist was used to provide a valid representation of relevant factors to research questions. In addition, it seeks to describe the status identified and give systematic information about a phenomenon. (Van Wyk 2012.) Appendix 5: Quality assessment of qualitative studies applied from CASP Statement (C)

Scoring was used presented in percentages to show the comparison of the quality between study designs. The quality of observational studies was mainly high (81.81%- 97.73%), systematic reviews was high (83.33%- 90.74%), and qualitative review studies were average high (72.72%-90.90%).

5.6 Data Analysis

Data analysis is the most challenging phase of ILR. The meticulous process of creating novel ideas involve coming up with evidence-based data. Different data extracted from primary sources then thoroughly compared, itemized, coded, and categorized. This part is considered susceptible to mistakes and inaccuracy as these data will go through an evaluation and synthesis process. (Whittemore & Knafl 2005.) In this study, data analysis was based on Whittemore and Knafl method.

To further evaluate and better understand data analysis among researchers, Whittemore and Knafl offered a definite analysis method to associate various methodologist data (Whittemore & Knafl 2005, 546-550).

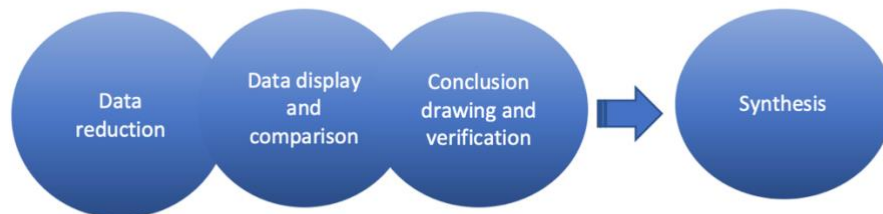


Figure 3: Data analysis process of an integrative literature review from Whitemore and Knafl (2005), modified by the author

Following data collection and research article screening, the author had determined all studies based on the identified research questions. Relevant studies were compiled in the research table (Appendix 2). Different suitable quality assessment tools were used to ensure the quality of included research articles. The five-stage methodology by Whitemore and Knafl was used to perform data analysis. Firstly, the data extraction of similar data from primary sources phase. In the analysis phase process, the author primarily read repetitively all the resources identified. Sentences and paragraphs that answered and associated with research questions were highlighted and gave emphasis. Secondly, the data reduction phase. Data extracted from primary studies identified leading to data reduction. The identified studies were further assessed and evaluated based on the content and relevance to the study. Additional data were reduced as we went further. Data extracted from primary studies were identified, leading to data extraction. Thirdly, the data display phase. Collected data were arranged and categorized based on common themes and findings. Further data evaluation was also made through the data display spreadsheet. Fourthly, data comparison phase. Identified data were examined and categorized based on the study theme and research questions. Data comparison was made for justification. Finally, Results were regularly amended prior conclusions. To promote accurate and verified data, results of data analysis were compared to primary data gathered before drafting the results (Whitemore and Knafl 2005). (Figure 4)

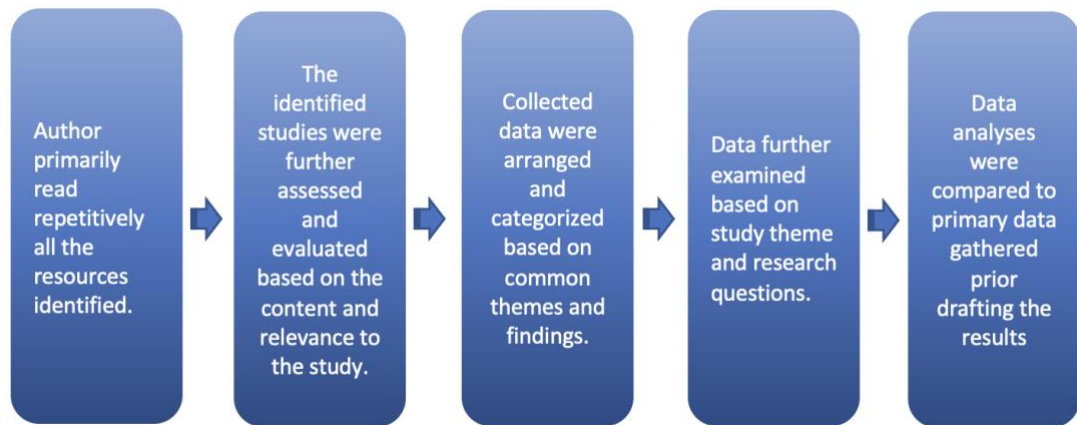


Figure 4: The data analysis process

6 Results

The data search output had identified 3484 references. References were eliminated or rejected due to duplicates present in other databases giving 3032 references. Titles and abstracts were also filtered based on quality and relevance, giving 141 references. References were eliminated or rejected due to irrelevant, unconnected, and not eligible based on inclusion-exclusion of the study, giving 17 references. Out of seventeen included studies, there were five observational, six systematic reviews, and six qualitative. (Figure 5) Most studies were completed between 2012 to 2021. From 2015 to 2021, twelve studies were published, while between 2012 to 2014, there were five studies published. Most of the studies were conducted and published in the United States (n=12). Other studies were also conducted and published in the United Kingdom (n=3), Peru (n=1) and Switzerland (n=1).

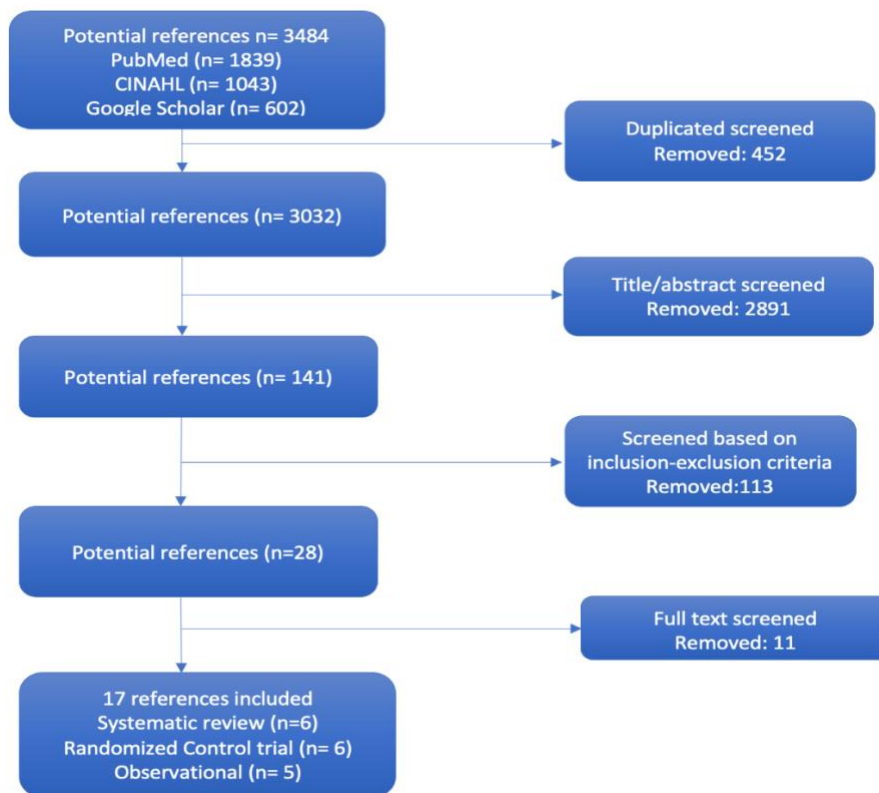


Figure 5: Data review process according to PRISMA flowchart

6.1 Social Media Used in HIV prevention

As social media being influential to the nation, researchers explored different social media platforms that are believed to be practical tools and methods in HIV prevention. The use of social networking sites (SNS) as an influential tool for enhancing individuals' knowledge, behaviours, and attitudes towards sexual health. Social media and health promotion were interlinked to educate and further improve health interventions. Abstinence and good psychological outcomes were also developed through electronic communication. The proper use of new technologies, including social media sites, to maximize its benefit among adolescents was highly suggested. (Dunne, McIntosh & Mallory 2014.) In addition, internet-based interventions were an integral approach to win against HIV. The growing demand and reputation of social media such as Facebook can be colossal anticipation to combat HIV and promote HIV prevention. Continuous innovation and ways to use online social media sites can potentially reach prospective African American MSM and other high-risk groups and a vast population. (Jaganath et al. 2012.)

Moreover, Buckingham et al. (2017) retrospective and observational study in the USA involved participants through four popular social media sites as 45.1% of users came from Facebook,

22.5% from GRINDR, 16.9% came from Craigslist, 15.5 % through a web-based marketing company. The study made use of comparison based on the effectiveness and efficiency of the said social media sites used by MSM and transgender women concerning the HIV prevention vaccine trial. Result findings showed GRINDR was the most effective site for social media and online strategies. (Buckingham et al. 2017.)

Furthermore, Kudrati, Hayashi and Taggart (2021) systematic review emphasized that the delivery method of social media had become a mode of communication regarding HIV prevention, awareness and knowledge among Black and Latinx MSM and women. Different social media platforms were reviewed that engaged young racial and sexual minority men and women at high risk for HIV. Researchers found the effectiveness of different social media mobile apps to enhance PrEP and HIV prevention knowledge and adherence. Android apps from Google Play and Apple Apps store provided different features vital in increasing awareness, especially in high risks for HIV. Examples were studies that assessed the favourable effect of a comprehensive HIV prevention app for Black and Latinx MSM specific to HIV prevention recommendations, quizzes to self-assess PrEP eligibility, and links to other prevention services. Eleven apps were found by the study containing comprehensive Prep and HIV prevention information. These apps contained feature resources relevant to clinics and HIV prevention clinics and other options such as self-assessments, service locators, and adherence number systems. Based on the study, Facebook and Instagram were also powerful tools in promoting information about HIV prevention and PrEP. Researchers included an article titled, "There is a new pill to revolutionize Black women's sexual health," to a Facebook page on Facebook. The article explored issues involving black women's perception of sexual health and HIV prevention by gathering and assessing comments and feedback from the Facebook platform. The said article had reached 678 likes, 451 shares, and 131 comments. The study also evaluated a campaign for HIV prevention called #PrEP4Love (P4L) through views on Facebook and Instagram. A total of 40,913,560 collective views were generated across smart ads, Facebook ads, and Instagram ads. Ads contained information about HIV Prevention medication that caught online users. (Kudrati, Hayashi & Taggart 2021.)

Studies found that Twitter was also used in the promotion of HIV prevention and PrEP use. Researchers had identified and monitored "tweets" and "re-tweets" posted by different organizations, including news media. Their content analysis in the HIV prevention and PrEP category stated the most tweeted was "recipients," associated with who has received or should receive the PrEP. In addition, 60.2% of the tweet posted links to referenced articles about Truvada from news media. The study had identified 217 videos relevant to PrEP and HIV prevention from YouTube. 82.9% showed the definition of PrEP, 49.3% described how PrEP works, 60.8% described who can use PrEP, 23% promoted PrEP as the safe option, 32.3% informed about the side effects, 35.9% showed how to get PrEP, 27.6% discussed the cost and

83.4% promoted the use of PrEP. All these videos generated 2,369,003 views in total. Data analysis showed that the comments and views were popular among the general MSM population, significantly higher than the videos popular to the scientific community, $p= 0.04$ and 0.01 , respectively. (Kudrati et al. 2021.)

Different social media sites are used as necessary in HIV testing and HIV prevention information. Popular social media sites such as Adam4Adam, BlackGayChat, Craigslist, and Gay.com enhanced communication activities to address HIV prevention intervention and management. The study also suggests further research to replicate their findings to current and future technology such as GPS-based mobile commonly known as "hook up app" such as A4A/Radar, Grindr, Jack'd, and SCRUFF popular social media apps such as WhatsApp and WeChat. (Rhodes et al. 2016.)

Also, Taggart et al. (2015) systematic review presented different studies with the association of HIV prevention and social media sites and mobile technologies. Different studies were included based on the study theme, including communication about HIV information and strategies, different social media use to communicate, and all study designs. Results showed that 35 studies included using seven electronic databases. Eight social media platforms identified in the study, short message service text messaging was popular among individuals. Social media platforms became an integral part of health HIV prevention information dissemination, experience sharing, social support, and medication adherence promotion. Study results showed social media benefits include the ability to share and receive information about HIV. Different social media platforms connect the gap among worldwide users and social contexts. (Taggart et al. 2015.)

Young, Rivers and Lewis (2014) study established the approach using real-time social media data for HIV prevention. The study evaluated geolocated interactions about HIV risk behaviours from social media platforms, the prevalence and content, and the feasibility of HIV risk-related real-time social media communications. A total of 553,186,061 tweets were collectively gathered online and screened with HIV risk-related keywords. More than 9800 tweets were expedited and developed a map showing the location of HIV-related tweets was. The study showed a significant positive relationship between HIV-related tweets and HIV cases ($p < .01$). The study concluded that social media platform data to discover HIV risk behaviours and outcomes were beneficial and feasible, (Young, Rivers & Lewis 2014.)

Besides, Muessig et al. 2015 systematic review aimed to assess different social media platform strategies used in HIV prevention and care. eHealth, mHealth and "Web 2.0" were practical tools to enlist HIV high-risk groups. Twenty-three studies and 32 funded projects were identified and included in the study. Different databases used such as PubMed, Web of

Science, and NIH Reporter contain search keywords: HIV, eHealth, mHealth, smartphone, mobile phone, cell phone, mobile health, internet, online, app, application, social media, web, and Web 2.0. Results found the advantages of online social media platform use to HIV prevention and care. The consistency in HIV prevention delivery, cost-effectiveness and the capacity to circulate worldwide reach a wide range of populations. New online approaches were recognized, such as the uncomplicated use of the mobile phone to give reminders and track HIV information prevention. New technology was expected to give advances that ensure integrated sustained behavioural modification and biomedical strategies in HIV prevention. Studies identified established the effectiveness of online social media platforms in enhanced access for HIV prevention. eHealth, mHealth, and Web 2.0 can be used globally, especially in HIV risk groups. (Muessig et al. 2015.)

A systematic review outlined and appraised the eHealth social media platform to emphasize HIV prevention among MSM. Fifty-five articles were included in the study, which contains web-based, short message service (SMS)/text messages/email reminder, online video-based, computer-assisted, multimedia-based, social network, live chat and chat room, virtual simulation intervention, and smartphone applications. In addition, forty-nine studies showed that participants attained short-term behaviour changes using eHealth interventions. The study concluded that eHealth interventions were relevant in short term behaviour change among MSM and suggested more eHealth intervention methods should be developed to promote HIV prevention among MSM. (Nguyen et al. 2019.)

6.2 Different social media strategies in HIV prevention

Jaganath et al. (2012) study aimed to determine the acceptability, feasibility, and efficacy of using online social media sites for HIV prevention among African American and Latino MSM. The study was able to create an online strategy using the Facebook platform. Peer leaders were initially recruited and trained effectively about HIV prevention communication, cultural awareness, the role of technology, and Facebook. Questionnaires were given prior and post pieces of training for comparison of knowledge acquired. The new curriculum was formulated based on the HIV prevention C-POL approach using Facebook. Social context, HIV knowledge discussions and role-playing were done to understand better HIV prevention and other issues related to HIV and technology. As a result, the curriculum outcome served as an approach for social media and health promotions. In addition, the curriculum constituted a helpful guide in the use of social media platforms in delivering HIV prevention interventions and knowledge. (Jaganath et al. 2012.)

Further, Khanna, Schumm and Schneider (2017) stated in their study the increasing incidence of HIV among Young Black men who have sex with men (YBMSM) living in the United States.

The alarming situation inspired the creation of an online social media strategy through Facebook data site from "uConnect" longitudinal cohort study of YBMSM. Study findings showed many participants who became aware of PrEP from 45% to 75%. 88 Prep- unaware individuals became aware through follow up, and 56 stayed unaware. Participants who became aware through social media had a higher median number of friends that engaged in "uConnect" and had connections to higher influential friends. The study concluded the effectiveness of online social media strategies in promoting PrEP use and awareness to prevent HIV among YBMSM. (Khanna, Schumm & Schneider 2017.)

Furthermore, Kennedy et al. (2016) developed a personalised computer-assisted intervention strategy that provides feedback from a trained facilitator through motivational interviewing (MI). The strategy of the social media outcome was to motivate participants to promote HIV prevention and to avoid alcohol and drug use among individuals transitioning from homelessness to housing. There were 60 randomised individual participants allotted to either intervention or control condition. Led by the facilitator, the intervention group set four biweekly social network sessions. HIV risk behaviours will be continuously monitored before and during MI, and comparison among control groups will also be facilitated. The study outcome was developed an easy-to-use tool and tested this new technology's effectiveness, including motivational social network intervention. The outcome of this pilot test was also to inform significant research facilities that the bright future of new technology can lead to behavioural change promotion. (Kennedy et al. 2016.)

MacGowan et al. (2020) conducted a study that used online-web-based HIV testing resources combined with telephone calls. Their study aimed to evaluate the effect of providing HIV self-tests, diagnoses, and sexual risk behaviours necessary in HIV prevention. Through social media online banner advertisements, they were able to recruit 2665 participants. HIV testing was necessary to address prevention and treatment. Result findings showed that 76.6% of participants had HIV tests for three or more times. There were 34 newly identified HIV infections belonging to the Self-testing group during the trial. Social media sites were helpful means to encourage individuals to participate in the trial, and the distribution of HIV self-tests could increase awareness of HIV infections and prevent transmission. (MacGowan et al. 2020.)

Rhodes et al. (2016) study designed an intervention strategy to increase HIV testing among MSM and transgender through popular social media sites. They created a repeated cross-sectional matched-pair randomised trial design composed of intervention and comparison participants to identify changes after HIV testing interventions. No interventions were done to comparison participants. Different protocols were done based on social media sites such as Adam4Adam, BlackGayChat and Gay.com, wherein trained health educators included the

importance of testing, process, access, and other HIV prevention and management information in his profile. The educator posted questions and answers part and replied to any queries through text messaging. Craigslist protocol includes testing information available every 3 to 4 hours per day. Communication is used through email messages. 1292 participated in the study. Among the participants, 94% reported sex with at least one man in the past 12 months, 36% claimed to be bisexual and 13% heterosexual or straight. Result findings showed no difference in HIV testing rates between the intervention and comparison participants. After the test, 63.7% of intervention participants claimed to have HIV testing, while 42% of comparison participants had HIV testing within 12 months. The use of social media strategies increased awareness of HIV testing, and HIV prevention was increased through social media sites. (Rhodes et al. 2016.)

Sun, Hoytb and Pachankis (2019) cross-sectional study examined sexually active Chinese MSM enlisted from social media. A total of 403 participants were linked to MSM and sexual identity stigma using three types of sexual risk behaviour such as condom use, the number of anal intercourse partners and the number of engaged in condomless anal intercourse. 81.1% considered themselves gay, 54.6% were less than 25 years old, 67.2 % were single, and 78.1% were self-reported to be HIV negative. The study found out the association of the increased use of social media among participants increase in anal intercourse and condomless anal intercourse. The study concluded that a combination of social media, social life, and stress contributed to sexual behaviour risks among Chinese MSM. Social media platforms were relevant tools in the HIV prevention and intervention efforts to promote HIV prevention methods such as condoms and lessen sexual minority stigma. (Sun, Hoytb & Pachankis 2019.)

Young et al. (2013) designed a randomised, controlled trial with the concealed allocation that primary aim was to determine social networking technologies communities can increase HIV testing among African American and Latino MSM. The setting of this study was purely online. There were 112 MSM who participated in the study and 85% of whom were African American or Latino. Peer leaders were assigned to facilitate HIV prevention information or general health through social media platform called Facebook. Group engagement and participation were being monitored, and participants requested a home-based HIV kit and completed questionnaires and follow up after 12 weeks. They deliberately interacted through social media platforms where 95% of intervention participants and 73% of control participants. Of 57 intervention participants, 25 requested a home-kit test compared to 11 of 55 control participants. The study concluded that social media platforms and new technologies were effective methods in enhancing HIV prevention awareness and increasing home-based HIV testing, especially among HIV high-risk groups. (Young et al. 2013.)

Young et al. (2014) randomised control trial examined social media platforms on how HIV prevention intervention reaches individuals and increases HIV prevention, and testing behaviour affect changes through social media ties. 112 random racial minority MSM received peer-led HIV intervention and general health information (control) through the Facebook group. Baseline and follow-ups were done to acquire data for assessment on changes in network growth and if there were associations in health engagement and HIV testing. The result showed a significant positive relationship between increased network ties and social media interaction about sexual behaviours. A positive relationship was also found between increased network ties and HIV testing, follow-up, and online participation. The study concluded peer-led social media HIV interventions and HIV testing levelled up community adherence, especially HIV high-risk MSM. (Young et al. 2014.)

Young et al. (2015a) cluster randomised control trial evaluated the new online approach in Harnessing Online Peer Education (HOPE) social media intervention to elevate HIV testing adherence among MSM in Peru. Participants in the control group were given a package of care containing offline HIV prevention and participation in Facebook groups without peer leaders. Questionnaires were completed based on HIV risk behaviours, social media use, and three months follow up. 34 out of 49 peer-leaders were recruited and trained to facilitate interventions through the Facebook group platform. Individuals were randomly assigned (N=278) to an intervention group and (N = 278) to control groups. The study results show that 17% in the intervention group and 7% in the control group were tested for HIV. Peer-mentored social media interventions effectively promoted HIV prevention awareness and HIV testing adherence among MSM in Peru. (Young et al. 2015a.)

Young et al. (2015b) systematic review identified 33 studies exploring the feasibility of association of social media online technologies, HIV prevention and substance use. Online survey or observational studies and intervention studies such as text-message interventions were included. The study search terms used were substance use, stimulant use, methamphetamine, injection drug use, cocaine, substance abuse, opioid, HIV/AIDS, technology, social networking sites, social media, phones, smartphones, texts, internet, websites, and web. The study concluded that social media online technologies can create a new approach that is feasible and effective in providing HIV interventions such as promoting sexual health, sex positivity, and linkage to care and management. Text messaging, online apps and interactive voice response systems, and other electronic communication can be robust methods to reach the population, especially the low-literacy population. (Young et al. 2015b.)

After identifying social media used in HIV prevention, different online social media strategies are used to ensure participation, awareness, engagement, and effectiveness of HIV prevention intervention. A summary table of different online social media platforms and methods (Appendix 6) was generated.

6.3 Barriers in the implementation of social media in HIV prevention

Out of 17 references identified, only one reference contained barriers in the implementation of social media in HIV prevention. Dunne et al. (2014) explored social media options to educate the youth to make sound decisions about sexual behaviours and risks of sexually transmitted infections such as HIV. The study showed different manners on maximising the use of technology to increase teenagers' knowledge about sexual health. In addition, the study also identified barriers and challenges in the use of social media. The comprehensive coverage of social media could involve misinterpretation that soon may lead to negative behaviours such as early sexual intercourse, body image disturbance and poor nutrition. Study findings also revealed the inadequacy of prior research into social media that may lead to a lack of evidence-based information regarding the use of digital media sites. Delivery interruptions of interventions and access difficulty to study sites and intervention resources were challenges of using the internet and online technology. (Dunne et al. 2014.)

7 Discussion

Social media is a good technique in engaging individuals in the interaction and communication concerning HIV prevention and treatment as it allows the collaboration of a variety of platforms and online strategies from different agencies and organizations (Taggart et al., 2015). The evidence shows that different social media platforms are easily accessible and available online. Studies conducted by Jaganath et al. (2012), Young et al. (2013), Young et al. (2014), Young et al. (2015a) and Khanna, Schumm and Schneider (2017) all agreed and claimed Facebook to be the most effective platform. However, Buckingham et al. (2017) believed mobile app GRINDR is more effective in HIV prevention. Nonetheless, Rhodes et al. (2016) stated that Adam4Adam, BlackGayChat and Gay.com are effective tool in HIV prevention awareness. Globally, researchers created their own unique and distinct strategies that are significant in HIV prevention. Countless strategies depend on the study theme and participating target individuals.

This ILR provided that different online social media platform tools and strategies that researchers used for HIV prevention. According to Khanna, Schumm and Schneider (2017), despite PrEP significance in HIV prevention globally, still very low recognition among Young Black Men who have sex with men (YBMSM). Online social media platforms such as Facebook

became an avenue to reach out to the participants. The help of social media paved the way to elevate HIV prevention interventions.

In addition, Buckingham et al. (2017) found the geosocial networking app GRINDR was the most effective in reaching up a wide range of populations, especially the HIV high-risk group. Identical to other studies, loss of potential subjects had also been encountered, as out of 549 eligible participants, 253 individuals decided not to continue with the study. The study was able to differentiate recruitment between online social media and outreach targeting MSM or street recruitment. Outreach recruitments require late-night locations and events that lead to overtime pay and security concerns that contribute to high costs. Placing ads on GRINDR was also expensive, which is why Craigslist and Facebook were considered less expensive. A combination of online and outreach recruitment strategies was used to reduce costs and recruit the right people. (Buckingham et al. 2017.)

Also, the value of real-time social media networking technologies in identifying HIV high-risk individuals geographically can be charted the location and linked to national HIV data for analysis. The use of this social media platform is very relevant because it provides communication about HIV -risk behaviour and HIV surveillance. The increase in the number of social media data and public health departments perceive creating additional methods to monitor and distinguish sexual health behaviours accurately. A study proved that real-time social media communications in HIV prevention are feasible and can be used by other researchers to develop more effective and accurate outcomes for health information and HIV surveillance (Young, Rivers & Lewis 2014). The consolidation of network visualization, such as network structure and composition, were practical approaches to developing HIV prevention interventions. The transmission of online social media information electronically combines with motivational interview provide consistent intervention delivery maintaining personally relevant to the population. (Kennedy et al. 2016.)

Moreover, Kudrati et al. (2021) agreed to previous studies and provided in-depth evidence that social media is a promising approach in HIV prevention and PrEP awareness. The broad reach, accessibility, affordability, and usability are the reasons why online social media platforms dominate the whole world in terms of health information. YouTube acquire billions of users to create, share and watch videos wherever they are. Twitter has more than 214 users that promote HIV health information and prevention. (Kudrati et al. 2021.)

Instagram is also capable of sharing stories about PrEP and HIV prevention information to billions of users. Given the benefits and convenience of online social media platforms such as Facebook, Instagram and Twitter in providing communication information, it is also essential

to know the limitations in preventing misinformation and spreading non-prescribed PrEP medications. (Kudrati et al. 2021).

Rhodes et al. (2016) also agreed that using an innovative approach through an online social media platform made it possible for the study to identify infections and link individuals with HIV. Proper identification of said individuals had options for HIV information and care. Their study emphasized the relevance of using online social media platforms to address the increased HIV testing for HIV prevention and support sexual health. Sun et al. (2020) also added from their study that obtaining sex partners from social media lead individuals to have preparations before meeting up. Condom use became popular through online information. An online social community platform was organized to educate individuals on sexual health necessary in HIV prevention.

However, Dunne et al. (2014) emphasized the lack of available study interventions focused on cultural barriers and exclusion of multicultural ethnicities. If available favourable findings are available, the inadequate short-term follow-up after HIV prevention interventions will last for long. In the research analysis, their study found out the inadequacy of prior studies into social media. The negative impact of online social media use contains misinterpretations of information that soon may lead to possible unsound behaviours. (Dunne et al. 2014.)

According to Jaganath et al. (2012), the use of social media in health promotion contributed to ethical considerations that should be included in all training and protocol to protect all participants. Privacy and confidentiality must be considered, especially in the Facebook platform involved in private information, hacking and privacy rules. In the study, the Facebook group created for the study were all private and could not be easily searched, and participants should receive an invitation to join. To address privacy issues, administrative staff monitored the group regularly, and peer-leaders were notified when privacy settings changed. (Jaganath et al. 2012.)

The expansion of social media platforms designed for social networking and dating life for MSM depicts its purpose. As in their study finding, 69% of their participants had met their last sex partners online. MSM casual sex using these dating apps became common. (Sun et al. 2020.) Besides, third world countries also lack resources in the evaluation of eHealth interventions necessary for them to adopt since these countries have an increased prevalence of HIV among MSM (Nguyen et al. 2019).

Researchers suggest the importance of the content in creating behaviour change among online communities. It is believed that the engagement of individuals in social media platforms may be based on the content of the information available. The use of online social

media can be an avenue to easily collect data that can be processed to formulate effective HIV testing awareness and prevention interventions. (Young et al. 2014.)

7.1 Strengths and Limitations

The strength of this study is that it serves as a representation of a comprehensive view of other available evidence in using social media platforms and strategies worldwide. With the availability of various social media platforms, the study will give guidelines to the population and healthcare professionals on which social media platforms and strategies are best and effective to use. Different studies have the same theme as this study; however, reviews identified were mainly from the United States of America. The USA may have different regulations in using online social media compared with the European Union and other countries. This study produced a more recent view on social media platform use and strategies in the context of HIV prevention.

The inclusion and exclusion criteria were broad and ample to allow more selection of study resources materials. The author also used all study designs that include a wide range of comprehensive studies for assessment. Also, the quality of the references was used based on the appropriate assessment tools and carefully assessed and examined. The inclusion criteria were limited to studies published in the English language, which led to publication bias.

7.2 Ethical consideration

This study is theoretical and did not require ethical approval from an ethical board. However, the author's transparency in reporting the study is necessary to conduct an ethical literature review. In addition, the author has no conflict of interest, and no funding sources were used for this study; the study's progress is accurately stated and transparently.

The author followed the guidelines from Tutkimuseettisen neuvottelukunnan (TENK), aiming to promote the good scientific practice and ensure any form of breach will be dealt with fairly and professionally. According to The Human Sciences Ethics Committee of the Helsinki Region Universities of Applied Sciences (2020), Tutkimus-, kehitys- ja innovaatiotoiminta (TKI) or Research Development and Innovation can only be ethically acceptable and reliable if researchers adhere to good scientific practice. The key to acceptable practices is the following: 1) The research reflects honesty, general diligence, and accuracy in recording, presenting, and evaluating the research results. 2) Research is transparent, responsible for scientific communication, and complying with scientific research criteria and ethically sustainable. 3) The author will fully recognize the works and achievements of other researchers. Respect for others' work and publications and giving value and significance in their work will be considered. 4) Research plan, reports and data generated are stored in the

manner required by the requirements for scientific information. 5) Research permits will be obtained and evaluated based on ethical principles. 6) Rights, authorship principles, responsibilities and obligations will be agreed upon among the study participants. 7) Sources of funding will be disclosed, and a report will be included in the publication. (Finnish national board on research integrity TENK 2020.)

7.3 Recommendation

One of the findings of the study is the availability of online social media platforms globally. The presence of different platforms may confuse healthcare professionals, especially those working in infection control, on which is more effective in HIV prevention. The author recommends that government agencies and non-government organisations, in collaboration with health care professionals, invest and create a standardised cost-effective online social media platform and app that will focus mainly on HIV prevention.

To ensure proper and mannerly interventions are followed, the government must constitute and construct policy implications that will screen and govern online social media platforms in HIV awareness and prevention interventions. This study highlighted the lack of policies and proper evaluation on online social media platforms in HIV prevention by third-world countries, and it is highly recommended that an effective structure and system be used to address the concerns.

There is evidence that demonstrates the positive impact of the use of online social media on healthcare behaviours. The need for health care professionals, especially in infection control, to continuously learn and upgrade in knowledge and skills in the use of new technologies and to address the barriers and challenges in using social media in HIV preventions is also highly recommended.

Further research is needed to be designed on clinical benefit, implementation, cost-effectiveness, the effectiveness of social media platforms and strategies in HIV prevention involving a more significant number of participants. Future work by researchers must also focus on the long-term use of online social media platforms that will educate the population, especially the HIV high-risk group in HIV prevention.

8 Conclusion

HIV is a very debilitating disease as once you have it; you will have it the rest of your life. Young people, the minority and the most vulnerable, are continuously being affected by this disease. The virus has proven to have affected millions of lives around the world. PrEP,

condoms, and other HIV prevention methods are promising; however, the majority in the less fortunate countries still have no access to it. While we still have no concrete treatment for this virus, we can have a concrete plan to prevent it. Based on the studies, social media is undoubtedly an effective tool in health promotion and HIV prevention. For some, online social media platforms could be the next breakthrough in healthcare to maximise its purpose positively.

Nonetheless, the existence of different barriers and challenges endlessly exist. Continuously innovation combined with clear structure and policies will indeed address the challenges. According to Young et al. 2015b, the benefits of a study do not depend on technology alone and how it is being used. The study's success in HIV implementation is based on the proper incorporation of evidenced-based methods into technologies. Online social media is only a tool. The advantages can be successfully maximised or not, depending on how it is implemented.

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Figures

Figure 1: The five phases of integrative literature review	15
Figure 2: Data search from databases.....	18
Figure 3: Data analysis process of an integrative literature review.....	20
Figure 4: The data analysis process	21
Figure 5: Data review Process.....	22

Tables

Table 1: PICOTT model.....	17
Table 2: Inclusion and exclusion criteria	18

Appendices

Appendix 1: Timetable	42
Appendix 2: Characteristics of included studies	43
Appendix 3: Quality assessment of observational studies applied from STROBE Statement ...	53
Appendix 4: Quality assessment of observational studies applied from PRISMA Statement....	54
Appendix 5: Quality assessment of observational studies applied from CASP Statement	55
Appendix 6: Summary table of different online social media platforms and methods	56

Appendix 1: Timetable

<p>Planning stage</p> <ul style="list-style-type: none"> • Choosing the subject / Topic Analysis Presentation • Thesis Plan Presentation 	<ul style="list-style-type: none"> • June 2020 • August 2021
<p>Implementation stage</p> <ul style="list-style-type: none"> • Literature search and data collection • Data evaluation • Data analysis and writing synthesis 	<ul style="list-style-type: none"> • September- October 2021 • September - October 2021 • October 2021
<p>Final stage</p> <ul style="list-style-type: none"> • Presenting results • Publication 	<ul style="list-style-type: none"> • November 2021

Appendix 2: Characteristics of included studies

REFERENCE	COUNTRY	PURPOSE / AIM OF THE STUDY	DESIGN / STUDY SAMPLE	DATA/METHODS	FINDINGS	QUALITY ASSESSMENT
Buckingham et al. 2017. Going social: Success in online recruitment of men who have sex with men for prevention HIV vaccine research	USA	To examine four different social media platforms to engage men who have sex with men (MSM) and transgender women in HIV vaccine prevention trials.	Retrospective, observational study.	<p>The University of Pennsylvania HIV Vaccine Trials Unit (Penn HVTU) conducted street outreach and recruitment online.</p> <p>A combination of national recruitment messages with Philadelphia-specific language and imagery was used.</p> <p>Comparison of the efficiency and effectiveness based on demographics and risk behaviours of the participants were used.</p>	<p>Many MSM engaging in high-risk sexual behaviours were linked to the use of different social media recruitment platforms. They were also willing to take part in an HIV prevention vaccine trial.</p> <p>GRINDR social media use is the most effective way to recruit participants compared with other social media platforms.</p>	<p>41/44</p> <p>(93.18%)</p> <p>(A)</p>
Dunne, McIntosh & Mallory. 2014. Adolescents, Sexually Transmitted Infections, and Education Using Social Media: A Review of the Literature	USA	To explore different social media tools used in the information about sexual health to reduce risks of sexually transmitted diseases among adolescents.	<p>Review of the Literature</p> <p>Eight relevant articles were chosen based on inclusion-exclusion criteria.</p>	<p>EBSCOhost, MEDLINE, Academic Search Complete and Cumulative Index to Nursing and Allied Health Literature databases were used.</p> <p>A total of 4,516 articles were acquired using all databases. After a refined search, a total of 192 articles using the terms adolescents, text messaging, and interventions. A total of 8 final articles focused on keywords of adolescents,</p>	<p>The researchers suggested further studies into using computer technology about sexual health information to avoid sexually transmitted diseases among adolescents.</p> <p>Social media use could be the next breakthrough in public health that is more cost-effective in preventing</p>	<p>46/54</p> <p>(85.18%)</p> <p>(B)</p>

				sexually transmitted diseases, interventions, text messaging were chosen based on credibility, relevance, and level of evidence.	and managing sexually transmitted diseases.	
Jaganath et al. 2012. Harnessing Online Peer Education (HOPE): Integrating C-POL and social media to train peer leaders in HIV prevention	United Kingdom	<p>To develop an innovative tool on social media that might be used in HIV prevention.</p> <p>To develop innovative ways to use online social networking sites to scale HIV prevention interventions among high-risk groups.</p> <p>To evaluate the effectiveness of peer-led HIV prevention using social media among African American and Latino men who have sex with men (MSM).</p>	Longitudinal experimental study	<p>Peer leaders were recruited based on their online social networking and outreach experience.</p> <p>Knowledge, social context, and communication to role-play exercises on Facebook were also discussed.</p> <p>A control arm that mainly focuses on general health topics were created.</p> <p>Pioneering the use of Peer-led HIV prevention on Facebook, a new training curriculum such as the evidence-based C-POL method of HIV prevention was described.</p>	<p>Community Popular Opinion Leader (C-POL) model was able to develop as a tool to help in HIV prevention among African American and Latino MSM.</p> <p>The curriculum developed a framework that is useful to deliver HIV prevention and health promotion through social media.</p>	<p>36/44 (81.81%) (A)</p>

<p>Kennedy et al. 2016. A computer-assisted motivational social network intervention to reduce alcohol, drug, and HIV risk behaviours among Housing First residents</p>	<p>USA</p>	<p>To develop a computer-assisted intervention to lessen alcohol, drug and HIV risk behaviours that convey social network feedback from a trained facilitator.</p>	<p>Randomized Controlled Trial</p> <p>Sixty individuals who transitioned from homelessness to housing participated in the study.</p>	<p>Sixty participants were randomly assigned to the intervention or control condition.</p> <p>It consisted of 4 biweekly social network sessions using motivational interviews.</p> <p>Alcohol and other drug use and HIV risk behaviours will be monitored, explored, and compared to control participants' behaviours based on the changes and association to drugs and sexual behaviours.</p>	<p>The study developed a computer-assisted intervention that includes social network and motivational interview methods to lessen the risk of alcohol and other drug and HIV behaviour among the homeless.</p>	<p>17/22 (77.27%) (C)</p>
<p>Khanna, Schumm & Schneider. 2017. Facebook network structure and awareness of preexposure prophylaxis among young men who have sex with men</p>	<p>USA</p>	<p>To examine the link and association between social networks and Prep awareness using social media.</p>	<p>Longitudinal cohort</p> <p>Young Black men who have sex with men ages 16 to 29 years old, residing on the South Side of Chicago and engaging oral or anal sex with a male within the past 24 months</p>	<p>Awareness of the use of PrEP had impacted YBMSM through social media use. Two waves of Facebook data from "uConnect" were used.</p>	<p>The study showed an increase in PrEP awareness from 45% to 75%. There were 88 PrEP unaware became aware using social media follow up.</p> <p>Findings also showed that the potential use of social networks elevated the Prep awareness and used among YBMSM.</p>	<p>42/44 (95.45%) (A)</p>

<p>Kudrati, Hayashi & Taggart. 2021. Social Media & PrEP: A Systematic Review of Social Media Campaigns to Increase PrEP Awareness & Uptake Among Young Black and Latinx MSM and Women</p>	<p>USA</p>	<p>To conduct and evaluate the use of social media and campaigns to increase Prep awareness among Latino and young Black men who have sex with men (MSM) and women.</p>	<p>Systematic Review</p> <p>The study was able to screen (n= 1045) titles and abstracts.</p> <p>Eight relevant articles based on the inclusion-exclusion criteria were included in the study.</p>	<p>PubMed, Scopus, and Web of Science were the databases used.</p> <p>Inclusion criteria include the following: a study focused on social media platform used in Prep information campaign such as Facebook, Twitter, Instagram, and YouTube, among Black Latinx MSM and women under 29 years old, study conducted in the US and published after 2012.</p>	<p>Facebook, Instagram, and custom mobile applications are the most used social media platforms.</p> <p>Social media is a tool that may be used to educate, uptake and adhere young Black and Latinx MSM and women on PrEP.</p>	<p>49/54 (90.74%) (B)</p>
<p>MacGowan et al. 2020. Effect of Internet-Distributed HIV Self-tests on HIV Diagnosis and Behavioural Outcomes in Men Who Have Sex with Men: A Randomized Clinical Trial</p>	<p>USA</p>	<p>To assess the effect of HIV self-tests concerning sexual risk prevention, testing and diagnoses of HIV.</p>	<p>Randomized Clinical Trial</p> <p>The 12-month longitudinal, 2-group randomized clinical trial recruited MSM through online advertisements.</p> <p>Two thousand six hundred sixty-five participants, the mean age was 30 years, 1540 were white, and 443 had never tested for HIV before enrolment.</p>	<p>Participants did online surveys, telephone call notes and laboratory tests - results were included in the analysis.</p> <p>All of them had access to online web-based HIV testing resources.</p> <p>1:1 ratio to the control group or a self-testing (ST) group was done, 4 HIV self-tests post online survey given a choice to refill self-tests after completing quarterly surveys.</p>	<p>Three or more times were testing done by self-testing participants during the study than control participants 777 of 1014 vs 215 of 977; P < .01.</p> <p>Newly identified infections during the trial were doubled as high in the ST participants as the control participants 25 of 1325 vs 11 of 1340; P = .02.</p> <p>HIV self-tests distribution promotes HIV awareness and prevents transmission among MSM.</p>	<p>19/22 (86.26%) (C)</p>

<p>Muessig et al. 2015. A Systematic Review of Recent Smartphone, Internet, and Web 2.0 Interventions to Address the HIV Continuum of Care</p>	<p>USA</p>	<p>To assess and describe different technology tools concerning primary and secondary HIV prevention activities.</p>	<p>A Systematic Review Twenty-six relevant articles, 21 conference abstracts, 14 systematic reviews and meta-analysis studies and 31 studies from the NIH reporter database were used in the study.</p>	<p>Databases such as PubMed, Web of Science, NIH Reporter, and different conference databases were used between January 2013 and January 2014. Studies that include the utilization of internet and technology-based intervention about primary or secondary HIV prevention were used.</p>	<p>Benefits of mobile-based interventions and technology include the constant distribution of health interventions to the massive range of the population at a low cost. The widespread adoption of various methods such as social networking sites, real-time assessment and feedback, gamification, and virtual reality are needed.</p>	<p>49/54 (90.74%) (B)</p>
<p>Nguyen et al. 2019. A Systematic Review of eHealth Interventions Addressing HIV/STI Prevention Among Men Who Have Sex With Men</p>	<p>Switzerland</p>	<p>To appraise and characterize the eHealth interventions that address HIV prevention among men who have sex with men (MSM) and features of eHealth interventions.</p>	<p>Systematic Review Included in the study are Fifty-five articles, 17 pilots and 38 complete efficacy trials.</p>	<p>Web-based, short message service (SMS)/text messages/email reminder, online video-based, computer-assisted, multimedia-based, social network, live chat and chat room, virtual simulation intervention, and smartphone applications were used as intervention modalities.</p>	<p>Forty-nine eHealth interventions attained a short-term behaviour change among participants. There are limitations on interventions that could keep behavioural change over a year. Further evaluation of eHealth intervention strategies to promote HIV prevention among MSM is needed.</p>	<p>49/54 (90.74%) (B)</p>

Rhodes et al. 2016. Using Social Media to Increase HIV Testing Among Gay and Bisexual Men, Other Men Who Have Sex With Men, and Transgender Persons: Outcomes From a Randomized Community Trial	USA	To examine HIV testing intervention among MSM and transgender within commonly used social media. Promoting HIV testing through social media can increase and encourage individuals to do the testing.	Randomized Controlled Trial A total of 1292 participated in the study.	A repeated cross-sectional matched-pair randomized trial design with two intervention and two comparison communities to test if there will be changes in HIV testing over 12 months of intervention implementation were used. Social media sites used include Adam4Adam, BlackGayChat, Craigslist, and Gay.com. The health educator created a public profile and posted triggers about HIV, the importance of testing, his availability to provide information and answer questions about testing are also included in the profile.	63.7% of intervention participants had HIV status tested over the past 12-month compared with 42.0% of comparison participants. The use of social media can address different challenges in the community concerning HIV prevention and testing. Promoting HIV testing through social media can increase and encourage individuals to do the testing.	16/22 (72.72%) (C)
Sun, Hoyt and Pachankis. 2019. Sexual risk behaviours in the internet age: the case of Chinese men who have sex with men	United Kingdom	To examine and determine the association of social life and sexual identity stigma of sexually active Chinese MSM recruited online.	Cross-sectional study 403 Chinese MSM recruited online over 12-month period.	Qualtrics Survey was done anonymously online. Recruitment was done through advertisements on MSM and LGBT organization websites in China. Inclusion criteria include age 18 or older, self-identify as a Chinese man, fluent in the Chinese language, and experience sexual and romantic attraction to men. Participants were directed to an internet page indicating	Use of social media linked to increasing numbers of anal intercourse and condom use over 12 months. Social life was one factor in the increased use of social media about sexual risk among Chinese MSM. Social media was a promising tool in HIV prevention, and the presence of an online-based	43/44 (97.72%) (A)

				the survey's contents, requirements, and informed consent.	effort is needed to involve safe sex practice and lessen sexual minority stigma.	
Taggart et al. 2015. Social Media and HIV: A Systematic Review of Uses of social media in HIV Communication	USA	To demonstrate a thorough and up-to-date systematic review of social media and its use to communicate HIV prevention and treatment.	Systematic Review The authors used Literature dated before February 2014 with the use of 7 electronic databases.	The search identified 35 original research studies. The inclusion criteria focused on interaction about HIV, use of social media, social media platforms for communication and all study designs.	Eight social media platforms were identified, and "text messaging" was the most popular means of communication. Media platforms aim for health promotion, promote social support and medication compliance. Social media was commonly used by the ages 18 to 40 years old and lower-income population. The identified benefit of social media was HIV information, and challenges include technological factors.	47/54 (87.03%) (B)
Young et al. 2013. Social networking technologies as an	USA	To determine social networking can improve HIV	Randomized Controlled Trial	Sixteen peer leaders were randomly selected to provide information about	95% of intervention participants and 73% of	

<p>emerging tool for HIV prevention: a cluster randomized trial</p>		<p>testing among African American Latino men having sex with men.</p>	<p>112 African American or Latino MSM based in Los Angeles participated.</p>	<p>HIV health to the participants via Facebook groups.</p> <p>Participants were asked to join the group, and engagement was monitored.</p> <p>Participants may request free HIV home kits and completed the questionnaires, and a 12-week follow up.</p> <p>Acceptance, engagement, rates of HIV home kits tests and sexual risk behaviour were monitored.</p>	<p>control participants used social platforms.</p> <p>Out of 57 intervention participants, 25 requested home-based HIV testing kits compared with 11 of 55 control participants.</p> <p>9 out of 25 intervention participants who requested the test took it and mailed it back to compare with 2 of the 11 control participants who requested the test.</p>	<p>16/22 (72.72%) (C)</p>
<p>Young et al. 2014. Project HOPE: online social network changes in an HIV prevention randomized controlled trial for African American and Latino men who have sex with men</p>	<p>USA</p>	<p>To examine how HIV-prevention online social networks are associated with HIV prevention and increase testing behaviours.</p>	<p>Randomized Controlled Trial</p> <p>One hundred twelve ethnic minority men who have sex with men participated in the study.</p>	<p>One hundred twelve ethnic minority men (MSM) received peer-delivered HIV or general health information through the Facebook group over 12 weeks.</p> <p>Assessments were made on the changes in network growth based on engagement and HIV testing made by participants.</p>	<p>There was a significant positive relationship between increased network ties and social media as a platform for sexual behaviour discussions in the intervention group.</p> <p>HIV testing, follow up for test results and participation in online community conversation had a positive trending relationship.</p> <p>Peer-led social media HIV prevention interventions can</p>	<p>19/22 (86.36%) (C)</p>

					raise community adherence among high-risk MSM.	
Young et al. 2015a. The HOPE social media intervention for global HIV prevention in Peru: a cluster randomised controlled trial	Peru/USA	To examine the efficacy of the Harnessing Online Peer Education (HOPE) social media intervention that promote HIV testing among men who have sex with men (MSM) in Peru.	<p>Randomised controlled trial</p> <p>Participants in cluster randomised controlled trial were Peruvian who had sex with a man in the past 12 months, above 18 years old, HIV negative and had a Facebook account (N=556)</p> <p>For the intervention, trained Peruvian MSM and designated as HIV prevention mentors on Facebook groups.</p> <p>556 participants were randomly assigned to intervention groups (N=278) or control groups (N=278)</p> <p>The study recruited 49 peer-leaders; 34 had completed the training and were assigned randomly to Facebook groups.</p>	<p>Standard offline HIV prevention and the ability to participate in Facebook groups that gave updates on testing information were given to control groups.</p> <p>Questionnaires on HIV risk behaviours and use of social media over 12 weeks follow up were done.</p> <p>Facebook groups were analysed as part of intracluster correlations.</p>	Peer-mentored social media communities or the HOPE method can be a practical approach to raise HIV testing awareness among high-risk populations or MSM in Peru.	<p>20/22</p> <p>(90.90%)</p> <p>(C)</p>

<p>Young et al. 2015b. Use of Technology to Address Substance Use in the Context of HIV: A Systematic Review</p>	<p>USA</p>	<p>To better understand and address the increased risk of HIV infection on substance users with the use of new technology such as social media.</p>	<p>A Systematic Review 33 studies were identified between 2005 to 2015</p>	<p>A systematic database search on the U.S. National Library of Medicine's PubMed and PsycINFO were used. Studies were observational (n = 24) and interventional (n = 9) focused on exploring the feasibility of new technologies to study HIV and substance use.</p>	<p>Social media network sites are a powerful tool for public and individual health that demand strategies for evaluation and assessment that will require cooperation among agencies, researchers, experts, communities, and individuals.</p>	<p>45/57 (83.33%) (B)</p>
<p>Young, Rivers & Lewis. 2014. Methods of using real-time social media technologies for detection and remote monitoring of HIV outcomes</p>	<p>USA</p>	<p>To establish the feasibility of real-time social networking data for HIV prevention conversations, determine if it can be extracted from social networking data and discover the prevalence and content of these conversations.</p>	<p>Cross sectional study</p>	<p>N=553,186,061 tweets were collected online using a filter to include HIV risk-related keywords such as sexual behaviours and drug use.</p>	<p>More than 9800 tweets were extracted and used to make a map indicating the geographical location of HIV related tweets. There was a significant relationship between HIV-related tweets and HIV cases (p< .01). Using social networking data method in the evaluation and detection of HIV risk behaviours were feasible.</p>	<p>41/44 (93.18%) (A)</p>

Appendix 3: Quality assessment of observational studies applied from STROBE Statement (A)

REFERENCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Buckingham et al. 2017	••	••	••	••	••	••	•	••	•	••	••	••	••	••	••	••	•	••	••	••	••	••	41/44 (93.18%)
Jaganatha et al. 2012	••	••	••	••	••	••	•	••	•	••	•	•	•	••	••	••	•	••	•	••	••	•	36/44 (81.81%)
Khanna, Schumm & Schneider. 2017	••	••	••	••	••	••	••	••	•	••	•	••	••	••	••	••	••	••	••	••	••	••	42/44 (95.45%)
Sun, Hoyt and Pachankis. 2019	••	••	••	••	••	••	••	••	•	••	••	••	••	••	••	••	••	••	••	••	••	••	43/44 (97.72%)
Young, Rivers & Lewis. 2014	••	••	••	•	••	••	••	••	•	••	•	••	••	••	••	••	••	••	••	••	••	••	41/44 (93.18%)

- 1 Title and abstract are indicated
- 2 Background and rationale are explained
- 3 Specific objectives are stated
- 4 Study design is presented
- 5 Setting, locations and relevant dates are described
- 6 Eligibility criteria is described
- 7 Variables are clearly defined
- 8 Data sources/ measurement are described
- 9 Bias are described and addressed
- 10 Study size is explained
- 11 Quantitative variables are explained and described
- 12 Statistical methods are described
- 13 Number of participants are reported

- 14 Descriptive data is provided
- 15 Outcome data is reported
- 16 Main results are given or reported
- 17 Other analyses are reported
- 18 Key results are summarized
- 19 Limitations are provided
- 20 Interpretation is provided and analysed
- 21 Generalisability is discussed
- 22 Funding is presented

- Satisfies assessment criterion
- partly satisfies assessment criterion
- X hardly satisfies assessment criterion or assessment criteria do not apply

Appendix 4: Quality assessment of observational studies applied from PRISMA Statement (B)

REFERENCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	
Dunne, McIntosh & Mallory. 2014	••	••	••	••	••	••	••	••	••	••	x	•	••	x	••	••	••	••	••	x	••	••	••	••	•	••	••	46/54 (85.18%)
Kudrati, Hayashi & Taggart. 2021	••	••	••	••	••	••	••	••	••	••	•	•	••	•	••	••	••	•	••	••	•	••	••	••	••	••	••	49/54 (90.74%)
Muessig et al. 2015	••	••	••	••	••	••	••	••	••	••	•	•	••	•	••	••	••	•	••	••	•	••	••	••	••	••	••	49/54 (90.74%)
Nguyen et al. 2019	••	••	••	••	••	••	••	••	••	••	•	•	••	•	••	••	••	•	••	••	•	••	••	••	••	••	••	49/54 (90.74%)
Taggart et al. 2015	••	••	••	••	••	••	••	••	••	••	•	•	•	•	••	••	••	•	••	••	•	••	••	••	••	•	••	47/54 (87.03%)
Young et al. 2015	••	••	••	••	••	••	••	••	••	••	x	•	•	x	•	••	••	••	••	••	x	••	••	••	••	••	••	45/54 (83.33%)

1 Title is identified.

2 Abstract is defined.

3 Rationale is described.

4 Objectives are provided.

5 Eligibility criteria is specified.

6 Information sources are specified.

7 Search Strategy is presented.

8 Selection process is specified.

9 data collection process is explained and reported

10 Data items are presented.

11 Study risk of bias assessment are specified.

12 Effect measures are explained.

13 Synthesis methods are described.

14 Reporting bias assessment are described.

15 Certainty assessment are described.

16 Study selection is described.

17 Study characteristics are included and presented.

18 Risk of bias in studies are presented.

19 Results of individual studies are presented.

20 Results of syntheses summarized and presented.

21 Reporting biases are presented.

22 Certainty of evidence is presented.

23 Discussion is provided.

24 Registration and protocol are provided, indicated, and described.

25 Support is described.

26 Competing interests are declared.

27 Availability of data, code and other materials are reported.

•• Satisfies assessment criterion

• Partly satisfies assessment criterion

x Hardly satisfies assessment criterion or assessment criteria do not apply

Appendix 5: Quality assessment of observational studies applied from CASP Statement (C)

MacGowan et al. 2020	••	••	•	x	••	••	••	••	••	••	••	19/22 (86.36%)
Kennedy et al. 2016	••	••	•	x	••	••	••	•	••	•	••	17/22 (77.27%)
Rhodes et al. 2016	••	••	•	x	••	•	••	•	••	•	••	16/22 (72.72%)
Young et al. 2015	••	••	••	x	••	••	••	••	••	••	••	20/22 (90.90%)
Young et al. 2014	••	••	•	x	••	••	••	••	••	••	••	19/22 (86.36%)
Young et al. 2013	••	••	•	x	••	••	•	•	••	•	••	16/22 (72.72%)

1. Focused issue clearly addressed.
2. Assignment of patients to treatment randomized.
3. All patients in the trial properly accounted for at its conclusion.
4. Patients, health workers and study personnel “blinded” to treatment.
5. The groups are similar at the start of the trial.
6. Groups treated equally aside from the experimental intervention.
7. Primary outcome clearly specified.
8. The estimate of the treatment is precise.

9. The results can be applied to the local population or in your context.
10. All clinically important outcomes considered.
11. The benefits worth the harms and costs.

- Satisfies assessment criterion
- Partially satisfies assessment criterion

x Hardly not satisfies assessment criteria or assessment criteria do not apply

Appendix 6: Summary table of different online social media platforms and methods

Buckingham et al. 2017.	The study used a combination of street outreach and online recruitment to collect data associated with images and messages with specific language and imagery to enhance awareness in HIV prevention.
Dunne, McIntosh & Mallory. 2014.	A review of keywords such as adolescents, sexually transmitted diseases interventions, text messaging and social network sites provided insights on how healthcare providers could use tools to inform teenagers about HIV prevention.
Jaganath et al. 2012.	The study developed pioneering peer-led HIV prevention on Facebook and served as a new training curriculum such as the evidence-based C-POL method of HIV prevention.
Kennedy et al. 2016.	The study developed a computer-assisted intervention that includes social network and motivational interview methods to lessen the risk of alcohol and other drug and HIV behaviour among the homeless.
Khanna, Schumm & Schneider. 2017.	Two waves of Facebook data from “uConnect” provided new examination methods on different social networks among PrEP users in HIV prevention among YBMSM.
Kudrati, Hayashi & Taggart. 2021.	Facebook, Instagram, YouTube, and custom mobile applications were used as a mode of communication for health promotion about PrEP, HIV prevention of Black and Latin MSM and young women.
MacGowan et al. 2020.	The study used online web-based HIV testing resources such as HIV self-tests online surveys, telephone calls and laboratory tests for awareness and promotion of HIV prevention interventions.
Muessig et al. 2015.	The study used Real-time assessment, feedback, gamification, and virtual reality. HIV, eHealth, mHealth, smartphone, mobile phone, cell phone, mobile health, internet, online, app, application, social media, web, and Web 2.0 are tools used to collect HIV awareness and prevention data.

Nguyen et al. 2019.	Web-based, short message service (SMS)/text messages/email reminder, online video-based, computer-assisted, multimedia-based, social network, live chat and chat room, virtual simulation intervention, and smartphone applications were used as intervention modalities.
Rhodes et al. 2016.	Trained health educators used online social media sites including Adam4Adam, BlackGayChat, Craigslist, and Gay.com to communicate and empower participants to HIV prevention interventions.
Sun, Hoyt and Pachankis. 2019.	Recruitment through advertisements on MSM and LGBT organization websites was done. Participants were directed to a web page containing HIV awareness and prevention information surveys.
Taggart et al. 2015.	The study identified eight social media platforms containing HIV prevention information and social media platforms used for communication.
Young et al. 2013.	Trained sixteen peer leaders facilitated a Facebook group that provides information about HIV. Participants were asked to join the group, request free HIV home kits, complete the questionnaires, and have a 12-week follow-up. Acceptance, engagement, rates of HIV home kits tests and sexual risk behaviour were monitored by peer leaders.
Young et al. 2014.	One hundred twelve ethnic minority MSM received peer-delivered HIV or general health information through the Facebook group over 12 weeks. Peer-led social media HIV prevention interventions raised community adherence among high-risk MSM.
Young et al. 2015a.	Using Facebook and questionnaires, trained health mentors facilitated information through peer-mentored social media communities to increase HIV testing and HIV prevention awareness among Peruvian MSM.
Young et al. 2015b.	Facebook, Craigslist, online discussion forums or chat rooms, gay- or MSM-oriented dating or sexual networking websites or mobile apps, and email referrals were used to gather information for evaluation and assessment for HIV prevention interventions.

Young, Rivers & Lewis. 2014.	Tweets were collected online using a filter to include HIV risk-related keywords such as sexual behaviours and drug use. More than 9800 tweets were extracted and used to make a map indicating the geographical location of HIV related tweets.
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