

Article

The Impact of YouTube on Loneliness and Mental Health

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Abstract: There are positives and negatives of using YouTube in terms of loneliness and mental health. YouTube's streaming content is an amazing resource, however, there may be bias or errors in its recommendation algorithms. Parasocial relationships can also complicate the impact of YouTube use. Intervention may be necessary when problematic and risky content is associated with unhealthy behaviors and negative impacts on mental health. Children and adolescents are particularly vulnerable. Although YouTube might assist in connecting with peers, there are privacy, safety, and quality issues to consider. This paper is an integrative review of the positive and negative impacts of YouTube with the aim to inform the design and development of a technology-based intervention to improve mental health. The impact of YouTube use on loneliness and mental health was explored by synthesizing a purposive selection ($n = 32$) of the empirical and theoretical literature. Next, we explored human-computer interaction issues and proposed a concept whereby an independent-of-YouTube algorithmic recommendation system steers users toward verified positive mental health content or promotions.

Keywords: YouTube; loneliness; mental health; human-computer interaction; technology-based interventions

1. Introduction

1.1. Aim

This paper's aim is to understand the impact of YouTube on loneliness and mental health, both the positives and negatives, to inform the design and development of a technology-based intervention to improve mental health.

1.2. Use of YouTube and Different Perspectives in Research

YouTube is the world's most used streaming platform, the second most used search engine, and is host to numerous social media communities [1]. Although YouTube has universally delivered social interaction, information, news, and entertainment for a diverse range of users since 2005, there has been a significantly increased accessibility to content, including video blogging (vlogging), short original videos, and educational videos. A recent report noted that there are 2.6 billion monthly active users in over 100 countries, 720,000 h of video are uploaded to YouTube every day worldwide, and more than one billion hours of videos are watched every day [2]. Viewing is mostly on mobile devices as well as through computers or smart TVs. Health-related YouTube videos are used for the purpose of social utility, accessible information seeking/sharing, and leisure/entertainment [3].

YouTube applies a complex set of rules and data in a real-time feedback loop to find videos for viewers through the home page algorithm and recommended videos algorithm. These two YouTube algorithms operate a system consisting of a subservient information filtering system that provides recommendations for the items that are most relevant to a user [4]. It draws in videos and positions them according to the likelihood of being watched to achieve the aim of optimizing long-term viewer satisfaction. YouTube is a remarkable platform that assists users in conveniently aligning the supply and demand for viewing content. From a marketing perspective, researchers have sought to understand



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what motivates users' active participation and passive content consumption [5]. However, from a psychology perspective, there are important problems and risks to address, such as how vulnerable users, such as children and adolescents, are exposed to influential and exploitative content recommended by YouTube's algorithms [6]. Although YouTube is designed with the aim of sustained watching through finding the right video that appeals to each viewer, its algorithms are constrained to following a set of computer instructions.

YouTube's algorithms use artificial intelligence (AI) that analyzes complex unstructured data, such as that from media and entertainment. AI uses computers to perform intricate tasks, processing large amounts of data beyond human capacity. However, there is a potential for bias and errors in AI, despite it being capable of understanding patterns, making decisions, and judging [7]. YouTube's recommendation system processes videos according to search and viewing history as well as filtering content, including comments and descriptions. YouTube has parental controls and measures to promote verified positive mental health content and reduce the visibility of harmful content. Vetted resources and support are available for creators to boost accurate and supportive mental health content whereas content that encourages harmful attitudes or denounces mental illness are demonetized and removed. However, there is a need to counter the negative and potentially harmful content that finds a way through YouTube's recommendation system. Users may actively seek this content out or they should be more cautious about the sources they rely on for mental health information and support. The problem is that caution is not always exercised and there is a duty of care to vulnerable persons. Therefore, a technology-enabled solution may be useful in helping more users to be discerning and critical when engaging with mental health content on YouTube and to seek out verified evidence-based sources.

Technology-based interventions to improve mental health is a domain that mental health research is grappling with [8]. Similar to digital mental health interventions (DMHIs), it is a promising solution aiming to support increasing unmet mental health needs [9]. For example, we recently explored the potential of enhancing access to care and increasing outreach for the unserved and the underserved through linking Spotify advertisements to the MindSpot platform [10]. AI technologies may enhance the assessment, diagnosis, and treatment of people experiencing mental health issues and expand the scope and impact of mental health care. However, AI may also perpetuate mental health inequities among marginalized and vulnerable groups. A recent call to action suggested designing and implementing advanced methods for assessing and mitigating algorithmic bias through fair-aware AI in psychological science [11]. However, this is mostly at a theoretical stage and the lack of relevant studies in the mental health context means that it is necessary to consider further afield. For example, a technology-focused study described the design and evaluation of an independent-of-YouTube intervention to minimize ideological bias in YouTube's recommendation algorithms [12]. This study on countering radicalization shows new interest in systematic interventions focused on debiasing YouTube homepages and up-next recommendations. To our knowledge, there are no dedicated, AI-based, mental health interventions that steer users away from bias or errors in YouTube's recommendation algorithms.

1.3. Rationale for Current Research

The rationale for exploring this topic is that YouTube algorithms are challenged by effectively responding to the need for bespoke interventions that detect and moderate content verified as having a negative mental health impact. To help provide context to the issues underlining the rationale for the study, the next section will provide an overview of existing work on (1) The psychosocial impact from the use of social media, (2) The dichotomous mental health impacts from the use of YouTube, (3) When does high frequency YouTube use become a psychological risk factor? (4) Human-computer interaction (HCI) considerations of YouTube use. Then, in Section 3, we will describe the study methods, followed by the findings in Section 4, which focuses on loneliness and mental health issues from the use of YouTube. In line with the informatics genre, Section 5 explores HCI issues relevant to the use of YouTube.

2. Overview of Existing Work

2.1. *The Psychosocial Impact from the Use of Social Media*

Various frameworks have described the influence of social media on mental health. The theoretical framework of parasocial relationships has been long established in television, radio, online communities, and social networking sites, and in 2018, was found to be generalizable to YouTube [13]. During COVID-19, YouTubers applied parasocial relationships to help cope with the disaster [14] whereby vloggers established one-way close relationships with users. However, these engaging relationships are not real-life experiences. There is a potential for problems because vlogging may result in financial benefits, and the content may be glamorized, controversial, toxic, or less than ideal. YouTubers have overshared about their personal lives and/or been overwhelmed by attention from obsessed viewers to the point of tragic consequences [15]. The Displaced Social Behavior Theory describes how sedentary behaviors, such as social media use, detract from face-to-face social interaction, which are protective against mental disorders [16–18]. Two common frameworks connected to the positive and negative psychological processes of the influence of social media include the affordances approach and an elements-based approach [19]. The affordances approach focuses on the design and the functionality of features on social media platforms, in addition to how users relate to these features in terms of identity, social, cognitive, and emotional affordances. The elements-based approach considers the social media profile, feed, network, and message, whereby each of these elements guide users' psychological processes and influence their social media experiences.

The psychosocial impact of social media and internet use has been investigated in varying studies since 2007. For example, compulsive use counters the users' motive to relieve psychosocial problems through maintaining relationships and instead leads to negative life outcomes (e.g., worsened loneliness, depression) [20,21]. A 2017 study of social media use by young people in the UK reported that YouTube is the only social media platform to have positive impacts on depression, anxiety, and loneliness in users aged 14–24 [22]. Other benefits of this cohort using YouTube includes the understanding of others' experiences, expanded access to expert health information, emotional support, as well as an effective outlet for self-expression, developing self-identity, and community building. A 2020 systematic review on educational film-based interventions used by adolescents [23] found one randomized controlled trial (RCT) involving a YouTube video on mental health awareness and a control [24]. The 2015 RCT found that 87% of Arab American adolescents had not interacted with a health professional about a mental issue although 65% would consider doing so after viewing the YouTube video. A 2022 meta-analysis that examined the problematic use of all social media platforms found one study involving YouTube [25]. The 2019 cross-sectional study with French university students found that parasocial relationships are not negative, although it contributes to addictive behaviors on YouTube, especially in those with social anxiety [26].

The mental health impact of prolonged social media use has primarily focused on outcomes of depression, anxiety, and stress [13], especially in young people [19,26–28]. A correlational study with young adults investigated suicidality, loneliness, and decreased empathy in those who use social media and found that vaguebooking was predictive of suicidal ideation [29]. Berryman et al. suggested that intentionally vague, attention-seeking updates may indicate serious personal issues. Most of the research to date has focused on the negative outcomes of social media use, primarily through the Facebook platform, which may add to pressure to conform to stereotypical images and to gain popularity [18]. A review of the general public's online reaction to the COVID-19 pandemic through Twitter, Weibo, Google, Baidu, and YouTube found that these platforms provide novel data streams that can support public health strategies to reduce mental health disorders [30]. A recent study profiled young adult social media users' demographics in combination with mental health and wellbeing outcomes as well as platform use (i.e., Facebook, Twitter, Instagram, Snapchat, and YouTube) [31]. YouTube users were found to be the most likely to have poorer mental health outcomes. However, the proposal of a potential positive interaction

between adolescent social media use and mental health [32] points towards YouTube's dichotomous impact on mental health.

2.2. The Dichotomous Mental Health Impact from the Use of YouTube

YouTube has a different type of primary use (i.e., viewing content rather than creating/uploading it) and may therefore have a negative and/or positive impact on loneliness and mental health. A recent review found various ways in which dispositional, developmental, and social factors contribute to the impact of social media on adolescent mental health, notably depression and anxiety [19]. Whilst YouTube's use for peer-to-peer support has benefits, such as destigmatization and accessibility of information seeking/sharing, concerns are being raised about a lack of anonymity in how this support operates on YouTube [33]. As noted earlier, quality and safety concerns exist from parasocial relationships [6]. It is also unclear at what point YouTube use may become a psychological risk.

2.3. When Does High Frequency YouTube Use Become a Psychological Risk?

The mixed range of studies focusing on loneliness and mental health issues associated with problematic and extensive YouTube use [34–38] means it is difficult to generalize problematic use in terms of psychological risk. As a guide, more than 2 h a day is considered to be high frequency YouTube use, which is associated with a greater risk of compulsiveness and addiction [35]. The extensive use of YouTube was concluded to not inevitably be classified as dysfunctional, although some users may need to learn self-regulation. Affiliated studies suggested countermeasures such as information literacy education and training students to develop self-management strategies [36] as well as instilling academic institutional awareness about addiction risk reduction [37]. A study on user perceptions of loneliness showed that those who used social media 5–6 h a day were significantly more likely to associate with being “asocial” compared with those who used social media less than 2 h a day [38]. A lack of correlation studies means it is difficult to know how high frequency YouTube use contributes to psychological risk.

2.4. Human-Computer Interaction Considerations of YouTube Use

User-centered computing industry experts have been called upon to lead the codesign of technological, clinical, and family-based solutions to counter the psychological risks of social media use [19]. The problem is that these industry experts and stakeholders are grappling with the human factors of HCI in digital mental health (DMH) whereby promising solutions often fall to the wayside because of implementation teething problems [39]. There is also an uncertainty among both users and practitioners about which DMH platforms and DMHIs are effective, usable, and of good quality [40]. The uploading of YouTube content about mental illness does not classify it as a DMH platform or DMHI. However, the utility of YouTube means it is being increasingly used to deliver and watch mental health content. As a result, there is an opportunity to work on improving mental health outcomes associated with the use of this eminent platform and in the process, demonstrate how a broad-scale, technology-enabled solution may connect users with blended mental health care.

Overall, the work to date on the mental health impacts of YouTube use has established that (1) there is broad-ranging psychosocial impact across populations, (2) the subjective mental health impact may be negative and/or positive depending on the interaction of various dispositional, developmental, and social factors in association with psychological risk, (3) more than 2 h a day of YouTube use likely increases psychological risk, and (4) the effectiveness issues and HCI challenges that hinder the progress of DMH platforms and DMHIs calls for divergent technology-enabled solutions, such as increasing the positive mental health impacts of YouTube use and improving its connective capacity.

3. Methods

An integrative review digests past empirical or theoretical literature to provide a more comprehensive understanding of a specific phenomenon or healthcare problem [41].

This integrative review purposively sampled from four databases: Scopus, ScienceDirect, Sage, and the Association for Computing Machinery (ACM) Digital Library, using the search terms “loneliness” OR “mental health” AND “YouTube” OR “human–computer interaction”. The same search terminology was used in three search engines (PubMed, Google Scholar, and IEEE Xplore) as well as searching the reference lists of relevant reviews. Qualitative and/or quantitative studies in English were included if they were from peer-reviewed studies in journal articles reporting any impact or effect related to loneliness, mental health, and YouTube use as well as human–computer interaction. We also extracted from conference proceedings, book chapters, websites, a blog, and a handbook to help inform Sections 1 and 2, including reviewing the work to date for problem identification and determining the research aim. A 2005–2023 search range was applied because YouTube became generally available in 2005. Checks were conducted with combinations of alternative search terms including social media, social networking, psychology, psychiatry, mental illness, as well as algorithms, digital solutions, and technology.

The substantial between-study heterogeneity hampered the ability to perform a systematic review or meta-analysis. Therefore, a narrative synthesis of the included articles is presented. First, we independently assessed all abstracts against the inclusion and exclusion criteria according to the 5-step amendment [42] (see Table 1) of a modified integrative review framework [43]. This methodology was applied to critically evaluate and synthesize the reported outcomes of the theoretical and empirical literature on “loneliness and mental health issues from the use of YouTube” (see Chapter 4) as well as “human–computer interaction in the use of YouTube” (see Chapter 5). The synthesis included our views on clinical effectiveness, user impact, sociocultural impact, readiness for clinical or digital solutions adoption, as well as critical appraisal and evaluation. Next, we determined the rigor and contribution to data analysis (if any) before presenting a summary of important findings, as well as noting limitations and future research suggestions.

Table 1. Five step integrative review literature search method.

(1)	Problem identification
(2)	Literature search
	■ Participant characteristics
	■ Reported outcomes
	■ Empirical or theoretical approach
(3)	Author views
	■ Clinical effectiveness
	■ User impact (feasibility/acceptability)
	■ Social and cultural impact
	■ Readiness for clinical or digital solutions adoption
	■ Critical appraisal and evaluation
(4)	Determine rigor and contribution to data analysis
(5)	Synthesis of important foundations or conclusions into an integrated summation

4. Findings on Loneliness and Mental Health Issues from the Use of YouTube

4.1. Loneliness and the Use of YouTube

The World Health Organization (WHO) identified loneliness as an important public health concern characterized by a person feeling unhappy about being socially isolated [44]. Loneliness is treated as a symptom of mental health issues although it has been proposed to be a psychiatric disease [45]. This existential and difficult subjective experience may be transformed into a digital performance enabled by modern communication technologies, such as YouTube [46].

The COVID-19 pandemic exacerbated loneliness, for example, in already vulnerable groups, such as younger people [47] and older people [48], whereby preexisting mental illness may cause an excessively enlarged impact. In response, YouTube channels and videos were modified to assist with emotional health or exercise programs, mindfulness practice, and music programs. A study demonstrated how YouTube creators participated

in the #StayHome #WithMe Movement (SHWM) through the analysis of 1488 SHWM videos to examine video sharing as a pathway to social provisions [14]. The parasocial relationships formed with SHWM YouTubers were a psychological protective factor during the pandemic, although there are concerns that this trend will continue to the detriment of face-to-face relationships that previously served in a more protective way. For example, the concept of forming digital intimacies highlighted the potential unreal and extraordinary implications from when a single YouTube performer creates a closeness to a camera and microphone and devotes personal attention to the viewer [49]. The disconnection resulting from increased social media use is reportedly linked to a lack of deep human relationships and social connections, especially in young people [50]. This may lead to a sequelae of illnesses, although research on loneliness and social isolation is mainly focused on older people, which showed that there are links to heart disease, obesity, a weakened immune system, stroke, dementia, anxiety, depression, and death [51].

4.2. Mental Health Issues and the Use of YouTube

Mental health issues are classified by the WHO according to mental health disorders (i.e., anxiety disorders, depression, bipolar disorder, post-traumatic stress disorder (PTSD), schizophrenia, eating disorders, disruptive behavior and dissocial disorders, and neurodevelopmental disorders) [52]. Mental health disorders are a complex global challenge. The WHO recognizes that significant disturbances in thinking, emotional regulation, or behavior may be effectively prevented or treated, although most people do not have access to effective care. Mental health disorders normally onset in those aged 25 or younger [53]. Early intervention and secondary prevention in young people are important for intervening in the sequelae of mental illnesses [54] and their chronic impacts [55].

A recent literature review analyzed the link between the use of YouTube and some of the most relevant psychopathologies, including autism spectrum disorder, Tourette syndrome, schizophrenia, dementia, generalized anxiety disorder, and PTSD [56]. The results clarified how information disseminated through YouTube influences the viewers' health-related attitudes and behaviors, both positive and negative. For example, compulsive use is linked to anxiety, neuroticism, and personality, and students may be easily distracted from it being a source of information and instead use it for entertainment. The conclusion suggested expanding screening and treatment programs to cater to diverse contexts. There is a lack of studies that indicate how YouTube may assist users, their families, and professionals to access high-quality mental health information as well as with surveillance and interventions.

The growing number of studies since 2007 on the use of YouTube and associated mental health issues calls for an evaluative synthesis of the theoretical and empirical literature that incorporates all aspects of use (i.e., social interaction, information, news, and entertainment). Therefore, Table 2 presents an overview of the purposively selected studies on the use of YouTube and mental health issues (inclusive of loneliness and mental health disorders) to assist in clarifying the extent of the literature. The overview presents a chronological order of studies according to their design/main aim, how YouTube was used in the study, and what mental health indication/s and population/s were studied, as well as outcomes/findings.

Table 2. Overview of studies on the use of YouTube and mental health issues.

Reference	Authors	Study Design/Main Aim	Use of YouTube (Type, Purpose, Mental Health Indication/s and/or Population/s), Methods	Outcomes/Findings
[57]	Naslund et al. (2014)	Qualitative To examine the risks and benefits of individuals with severe mental illness uploading videos to YouTube, and posting and responding to comments as a form of peer support	Social interaction use (peer support). YouTube commenters responded to videos by individuals who self-identified as having mental health issues including schizophrenia, schizoaffective disorder, or bipolar disorder. Comments ($n = 3044$) were analyzed by thematic analysis	The data supports the notion of peer support in severe mental illness as inclusive and mutual advancement through shared experience and developing a sense of community. However, there is uncertainty for benefitting this community because of a lack of anonymity on YouTube which presents as a risk for being identified
[24]	Jaber et al. (2015)	Quantitative To examine the prevalence of depression and attitudes towards depression and mental health treatment in Arab-American adolescents	Education use. RCT with Arab-Americans aged 12–17 years recruited from a community center. Intervention group ($n = 46$): 4–5-min YouTube video by health professional on mental health awareness. Control group ($n = 42$): 4–5-min YouTube video by health professional on childhood obesity	Rate of depression (14%). Stigma is associated with both depression and seeking psychological help. Positive effect of an educational video about mental health stigma
[58]	Pereira et al. (2016)	Quantitative To look at men and women who utilized YouTube, to document their struggles with eating disorders (ED)	Information sharing use. Content analysis of testimonial videos ($n = 50$) including viewer response	Most posters used YouTube for peer-to-peer support beyond treatment. Most of the viewers responded with positive and supportive comments compared to negative comments (8:1)
[59]	Nour et al. (2017)	Qualitative To analyze the accuracy of depictions of psychosis in the context of a diagnosis of acute schizophrenia and to assess the utility of these videos as educational tools	Education use. YouTube videos purporting to show acute schizophrenia ($n = 4200$) were assessed by two consultant psychiatrists for diagnostic accuracy, psychopathology, and educational utility	Some schizophrenia presentations on YouTube were deemed inaccurate and containing non-specific psychopathology. The potential for inaccurate information should be noted for mental health care professionals, students and patients seeking health information
[60]	Zheng and Woo (2017)	Qualitative To compare YouTube against traditional talk-based workshops in delivering dementia knowledge to the Chinese-American population	Education use. A 17-month period comparison of a talk-based workshop with a real-time recording on YouTube (i.e., two 25-min videos) involving a board-certified psychiatrist on a North American Chinese television station who gave an educational talk about dementia	A talk-based workshop is more desired in delivering dementia education to the older Chinese-American ethnic population
[37]	Klobas et al. (2018)	Quantitative To compare the effects of use motivation and personality on compulsive use of YouTube among Malaysian university students	Information, learning and entertainment use. A paper-and-pencil questionnaire was administered to university students ($n = 807$) and analyzed using hierarchical multiple regression	Users with a tendency toward anxiety and neuroticism are a little more at risk of compulsive YouTube use than others. Those with a motivation to use YouTube for entertainment are much more likely to use it compulsively—there is a small countereffect of use for information and learning. Research on self-management interventions in education is required

Table 2. Cont.

Reference	Authors	Study Design/Main Aim	Use of YouTube (Type, Purpose, Mental Health Indication/s and/or Population/s), Methods	Outcomes/Findings
[61]	Kumar and Jha (2018)	Quantitative To assess the quality, in terms of the amount and accuracy of the information provided on psychosocial interventions for individuals diagnosed with schizophrenia	Education use. YouTube videos were searched ($n = 49$) for being related to psychosocial interventions for schizophrenia	Most of these videos have been posted by professionals or professional groups presenting the information in a simple manner and having reliable content. However, the descriptions of the interventions are not adequately detailed
[26]	de Bérail et al. (2019)	Quantitative To identify the determinants of YouTube addiction by examining the relationships between social anxiety, parasocial relationships with YouTubers and YouTube addiction based on a cognitive-behavioral theoretical framework	Entertainment use. Cross-sectional study from an online survey of French university students and non-student international participants ($n = 932$) investigating parasocial relationships, addiction, social anxiety, attachment styles, social isolation, loneliness, perceived social network support	Parasocial relationships are not negative, although it contributes to addictive behaviors on YouTube especially in those with social anxiety. A moderated-mediation model may help interventions for such at-risk persons e.g., through psychoeducation, guided Internet treatment and face-to-face cognitive-behavioral therapy
[62]	van der Velden et al. (2019)	Quantitative To examine the independent predictive values of social networking sites-use	Different types of use. YouTube in combination with various social networking sites (e.g., Facebook, Instagram, Twitter, LinkedIn, Google+, Pinterest, Flickr). A population-based prospective study applied logistic and multiple regression analyses of mental health and sleep problems, loneliness and demographics data from the Longitudinal Internet studies for the Social Sciences panel based on a random sample of Dutch residents ($n = 3486$)	When controlling for prior problems and loneliness, social networking sites-use does not or hardly predicts mental health and sleep problems on the short or long term
[63]	Villagonzalo et al. (2019)	Quantitative To identify demographic, clinical, and personal variables associated with overall and mental health-related internet use	Different types of use. YouTube in combination with internet use in general by adult community mental health service users ($n = 189$) with nonaffective and affective psychotic disorders	Of those who regularly used the internet (87.3%), most (67.9%) reported using the internet for mental health information, which is associated with younger age, higher levels of overall internet use, current productive employment, and higher loneliness. This population are overall suitable for engagement with online mental health information
[64]	Devendorf et al. (2020)	Quantitative To analyze YouTube as a platform that facilitates public presentations for depression	Different types of use. Content analysis of YouTube videos on depression ($n = 327$)	Depression is commonly presented as a biological or environmental condition, and one that is chronic, treatable (often with medication, therapy, or diet/exercise behaviors), recurrent, and has few benefits associated with experiencing it. Further research on this topic and improvements are needed in message framing
[65]	Guo et al. (2020)	Quantitative To understand the role of using YouTube as a platform for psychiatric emergency outreach among Chinese Americans	Information sharing use. The sample of this study includes viewing data ($n = 5976$) during a five-year period with regards to three videos in Cantonese about psychiatric emergencies	Most of the views came through YouTube recommended videos. There is a good potential to explore the effectiveness of using social media and wireless devices for psychiatric emergency education in minority populations prior to emergency department arrival

Table 2. Cont.

Reference	Authors	Study Design/Main Aim	Use of YouTube (Type, Purpose, Mental Health Indication/s and/or Population/s), Methods	Outcomes/Findings
[66]	Niederkrötenhaler et al. (2020)	Quantitative To investigate the quality of German language videos on YouTube based on media recommendations for suicide reporting	Information sharing use. Content analysis of randomly selected YouTube videos retrieved with the suicide method- and help-related search terms, were compared to search results for “suicide” ($n = 232$)	YouTube video content related to suicide are mainly inconsistent with recommendations for safe suicide portrayals in the media. YouTube has a worse mean ratio of potentially protective to harmful characteristics than material retrieved on search engines such as Google. Improvements are needed for safe and accurate information to users who are looking for information on suicide
[67]	Woloshyn and Savage (2020)	Quantitative To describe the dominant messages that individuals who self-identify with the diagnosis of borderline personality disorder (BPD) present through YouTube videos	Information sharing use. Content analysis of YouTube videos on BPD ($n = 349$)	The nature and content of BPD first-person YouTube uploads has increased and changed over time. Positive examples may be used by mental health practitioners to promote engagement in help-seeking and effective coping behaviors
[68]	Zhang et al. (2020)	Quantitative To examine, among college students in the United States, the relationships of deteriorating depression and anxiety conditions with the changes in user behaviors when engaging with Google Search and YouTube during COVID-19	Different types of use. Longitudinal observational study on Google Search and YouTube history data correlated with pre- and post-pandemic measurement of anxiety and depression levels in college students ($n = 49$)	Changes in Google Search and YouTube behavior were significantly correlated with deteriorating depression and anxiety conditions. Feasibility—the proposed features may be used to build predictive machine learning models for noninvasive mental health screening
[69]	Choi et al. (2021)	Quantitative To identify strategies for using video-based social media to combat stigmatized diseases, such as mental health, among college students	Different types of use. Inductive content analysis to identify the different types of YouTube videos concerning college students’ mental health ($n = 452$) according to video attributes, including poster, perspective, and purpose	YouTube videos on college students’ mental health can be well differentiated by the types of posters and the purpose of the videos. Sharing information about mental health from personal experience were the most engaging videos. YouTube has a good potential for providing social support, validating experience, and positively sharing help-seeking among college students
[70]	Gaus et al. (2021)	Quantitative To identify if depression personal account videos (DPAVs) reference youth, suicidality, and depression treatments	Information seeking use. DPAVs were identified using 4 search phrases on YouTube and included if they were longer than 2 min, from a unique creator, and had more than 5000 views	There is a frequent prevalence of youth, suicidality and self-harm, and clinical treatment references in DPAVs on YouTube and in their comment sections. Future research is needed to determine motivations of viewing videos, accuracy and usefulness. There is a need for safety guidelines for video creators and users. Practitioners should assist youth with assessing accuracy of information provided on YouTube
[71]	Gharani et al. (2021)	Quantitative To adopt an unsupervised data-driven approach as opposed to a model-based assumption about the association between social media use and loneliness	Different types of use. Various social media platforms were investigated although predominantly YouTube. Online survey investigated perceived social well-being and functioning, self-rated loneliness and mental health, and overall physical health of US adults ($n = 20,096$)	Non-Hispanic white female YouTube users aged 25–44 years who have high school or less education level and are single or never married have more significant high loneliness. This appears to be associated with self-reported poorer physical and mental health outcomes

Table 2. Cont.

Reference	Authors	Study Design/Main Aim	Use of YouTube (Type, Purpose, Mental Health Indication/s and/or Population/s), Methods	Outcomes/Findings
[72]	Jung and Kim (2021)	Qualitative and quantitative To examine how deliverers of suicide-themed contents on YouTube discuss suicide and to examine what factors, among content provider characteristics, story characteristics, and content expression characteristics, predict viewer engagement	Content uploader and message deliverer use. Preliminary coding analysis of users determined the characteristics of the suicide-themed content according to graphic, verbal, and textual expressions of suicide method. A content analysis method applied a hierarchical multiple regression to identify the factors that draw viewers to suicide-themed videos on YouTube ($n = 589$)	Viewers are more engaged with the content when the deliverers have close experience of suicide. Sharing suicide stories through art, music, and film such as in vlog format is involving, whereas lecture-based or preaching approaches are less involving in terms of likes and comments. Therefore, who presents the message is perceived as more significant than the characteristics of the message. YouTube may facilitate mental health support, education and suicidal ideation diagnosis
[73]	Keating and Rudd-Arieta (2021)	Quantitative To examine attitudes and beliefs of emerging adults about suicide and identify whether relationships exist with technology/social media use	Different types of use for YouTube as well as listening to music, texting, streaming movies, and Snapchat. A descriptive correlational study with young adults aged between 18 and 29 years ($n = 297$)—an online survey examined attitudes about suicide and technology use	Significant relationships were found with technology/social media, including a positive relationship between YouTube and glorification/normalization of suicide. Further research recommended on relationship between social media use and attitudes about suicide
[74]	Vuorre et al. (2021)	Quantitative To investigate whether technology is becoming more harmful to mental health	Different types of use. Different types of technologies including YouTube. An online survey examined users aged 10–15 years for changes in associations between technology engagement and mental health in three nationally representative samples in the UK and US	There is little evidence for increases in the associations between adolescents' technology use and mental health. Future studies should use data that afford a more detailed, more accurate, and less biased look into the individuals engaging with technologies
[75]	Woznicki et al. (2021)	Quantitative To explore how parasocial relationships with LGBTQ YouTubers may moderate the links between family support, loneliness, and depression symptoms among LGBQ emerging adults living with their parents during the COVID-19 pandemic	Entertainment and social interaction use. Mid-pandemic measurement and cross-sectional correlations of frequency of YouTube Use, family support, loneliness and depression symptoms as well as parasocial relationship strength in LGBQ US-based adults aged 18–23 ($n = 183$)	Associations between family support and loneliness, and between loneliness and depression symptoms, were weakened by high parasocial relationship strength. Engagement–potential of YouTube to be used as a complementary digital solution to assist at-risk LGBQ youth
[76]	Akhther and Sopory (2022)	Quantitative To determine whether self-ratings of depression and anxiety, perceived peer support, and perceived health benefits of social media predicted mental health-related information seeking and sharing behaviors during the COVID-19 pandemic	Information seeking and sharing: use of various social media. A cross-sectional online survey of a randomized sample of the general population ($n = 865$) investigated experience of COVID-19, social media use, information seeking and sharing about mental health, depression and anxiety self-ratings, perceived health-related social media peer support, and perceived health benefits of social media	YouTube, Facebook, and Instagram were used the most for information seeking and Facebook, Instagram, and Twitter were used the most for information sharing. Social media mental health-related seeking and sharing behaviors may help facilitate coping. Conceptual finding-social media may be used in tailored approaches to serving people with specific mental health conditions (e.g., severe depression and anxiety)

Table 2. Cont.

Reference	Authors	Study Design/Main Aim	Use of YouTube (Type, Purpose, Mental Health Indication/s and/or Population/s), Methods	Outcomes/Findings
[31]	Di Cara et al. (2022)	Quantitative To provide estimates of demographics as well as mental health and well-being outcomes by social media platform	Different types of use. YouTube in comparison Facebook, Twitter, Instagram, Snapchat. Longitudinal study with parents and children population cohort ($n = 4083$). Descriptive analysis was conducted	YouTube users are the most likely to have poorer mental health outcomes (wide range of indications) in both sexes although their use is mostly passive and for longer than the other platforms. They were likely drawn to experience benefits such as community building and peer support as opposed to social networking
[77]	Ghate et al. (2022)	Quantitative To identify the potential role of social media in trichotillomania	Information sharing use. Cross-sectional observational study involving content analysis to examine the most-viewed YouTube videos ($n = 100$) for trichotillomania content until June 2018	Mostly positive messages/information, and helpful recommendations for trichotillomania were found on YouTube. It may therefore be an underleveraged platform for this disorder
[78]	Jones et al. (2022)	Quantitative To pilot a brief online video-based intervention that aimed to increase help-seeking attitudes, intentions, and mental health literacy (specifically depression literacy) in an athletic population	Information sharing use. Online convenience sampling recruited athletes ($n = 207$) to video intervention on YouTube followed by an online survey on injury response, help-seeking and social support, and signs/symptoms of depression	YouTube videos that provide information targeting help-seeking during times of injury showed promise. This may have a flow on effect by reducing the negative psychological impacts of injury, such as depression, stress, and anxiety. However, an RCT design was recommended in addition to exploring if an improvement in attitudes or intentions corresponds with increased help-seeking behavior
[79]	King and McCashin (2022)	Qualitative To gain insight into how YouTube commenters are responding to vlogs centered on BPD	Social interaction use. YouTube commenters (both with and without mental health issues) responded to vlogs on mental health support for BPD. Comments ($n = 1197$) were analyzed by thematic analysis	The data provided opinions and knowledge of BPD with key themes indicating solidarity, support, de-stigmatization, normalization, sharing, comfort and encouragement
[80]	Lee et al. (2022)	Quantitative To examine the relationship between frequent social media use and subsequent mental health in a representative sample of US adolescents	Different types of use. Longitudinal study of YouTube, Snapchat, Instagram, Twitter, Facebook use and internalizing mental health problems of US adolescents ($n = 5114$) as per four waves (2013–2018) of nationally representative Population Assessment of Tobacco and Health data	Frequent social media use is probably associated with poorer subsequent mental health for adolescents, in both boys and girls. Future research would benefit from such continuous measures, including other aspects of mental health and potential differences in social media usage as well as the relationship between social media use across different platforms and mental health
[81]	Lotun et al. (2022)	Quantitative To assess whether parasocial interventions reduce prejudice towards people with mental health issues by first creating a new parasocial relationship with a YouTube creator disclosing their experiences with BPD	Information sharing use. Online non-randomized correlational study with non-BPD affiliated adults aged 18–35 ($n = 557$). Causal analysis to determine the influence of parasocial relationship strength on prejudice	The intervention successfully reduced explicit prejudice and intergroup anxiety. Preliminary findings suggest that lower prejudice is sustained over time. Prejudice intervention studies are a time-efficient, cost-efficient, and largely scalable remedy, compared to face-to-face interventions

Table 2. Cont.

Reference	Authors	Study Design/Main Aim	Use of YouTube (Type, Purpose, Mental Health Indication/s and/or Population/s), Methods	Outcomes/Findings
[82]	McLellan et al. (2022)	Qualitative To examine public online discourse in response to amateur YouTube videos that purport to de-stigmatize mental illness	Information sharing use. Thematic analysis—985 comments were randomly sampled for analysis from 12,842 comments collected	5 themes were found (1) community building, (2) personal experiences of mental illness, (3) personal experiences of stigmatization, (4) debates regarding the validity of the mental illness construct and (5) providing explanations for mental illness. Potential for both positive outcomes (e.g., finding community and encouragement) and negative outcomes (e.g., further entrenching stigmatizing beliefs about mental illness)
[32]	O'Reilly et al. (2022)	Qualitative What aspects of social media engagement do adolescents consider as positive for their own and others' mental health?	Different types of use. Social media, mainly YouTube videos and music on their phones. Six focus groups with UK adolescents aged 11–18 years ($n = 54$). Based on macro-social constructionism theoretical framework, a view that children and childhood are constructed and change over time	Adolescents are not a homogenous group and may be less vulnerable and more resilient than they are given credit for, in terms of social media use. Both the risks and the benefits to wellbeing should be considered
[83]	Sherman et al. (2022)	Quantitative To understand the trends of mental health topics through YouTube videos in the context of the COVID-19 pandemic	Different types of use. YouTube videos on COVID-19 from the US were reviewed for correlations in the context of mental health ($n = 100$)	Anxiety and depression were the most common mental health conditions experienced during COVID-19. Other mental health conditions and suicide were mentioned less frequently. YouTube is used prevalently and is a relevant and influential source for sharing information on mental health. Public health and government agencies could better use YouTube to disseminate coping skills and destigmatize mental illness

5. Human–Computer Interaction Issues in the Use of YouTube

HCI has a long history as an interdisciplinary field that draws on psychological models and studies on how people use technological objects and their design to potentially provide insight into human behavior [54,84]. There may be positive and/or negative conceptualizations of human interaction with YouTube. For example, YouTube may be positively useful for information seeking/sharing and mental health support [57,58,77,82]. However, there are indications that different types of YouTube use may be associated with negative mental health symptoms [31,37,73,80]. Furthermore, it is unclear how self-management counters these symptoms. There are a lack of digital interventions related to preventing inappropriate content reaching users despite YouTube's major investment and framed policies in protecting its users' mental health [85]. Therefore, an automated detection and moderation AI system is needed for filtering out potentially harmful YouTube content. AI is of interest because of its track record in providing solutions to a broad scale of problems. A review of detection and moderation capacities found that AI-based methods, such as Natural Language Processing (NLP) with Machine Learning (ML) algorithms and Deep Neural Networks, have been rigorously deployed [85]. However, YouTube content moderation is difficult to design because a detrimental impact may vary among users due to sociocultural differences.

It is proposed that the deployment of content detecting/moderating algorithms may extend from the predictive capabilities of machine learning and risk modeling based on mining unstructured data (e.g., from YouTube titles and text). Our previous reviews of HCI in DMH [39,54] highlighted the need to consider the advantages and disadvantages in the context of the systems that a proposed intervention may operate in. Advantages of the proposed concept may include observing and diverting the phenomena, self-management, inappropriate content exposure prevention, as well as moderating real-time interventions. Disadvantages include how to respond to ethical and privacy concerns of collected data, difficulties in achieving a complete psychological understanding of YouTube use, as well as problems in delivering effective integration of real-time interventions in a blended model of care (e.g., guided self-help, chatbots, and other web-based interventions mixed with face-to-face treatment).

Studies to establish the feasibility, usability, and effectiveness of YouTube content detecting/moderating algorithms are required. The user may suitably obtain digital guidance through technology-enabled screening and treatment for common symptoms, such as those of anxiety and depression. However, it may be more challenging to effectively engage more at-risk users, such as those with indications of BPD, self-harm, or suicidal ideation. Therefore, mental health practitioner involvement in decision-making and treatment is appropriate when high-level care is justified. However, users and practitioners are hindered by disconnected mental health apps and websites, as well as a lack of evidence of effectiveness [40]. This is compounded by data generally not being currently accessible across an integrated digital health platform. Therefore, the future scalability of YouTube interventions may be influenced by the capacity of digital assessment and intake systems.

6. Summary of Findings and Highlighting of Future Directions

6.1. Findings of Current Study

The integrative electronic search strategy yielded 32 relevant studies, most of which were quantitative ($n = 25$). There were six qualitative studies and one mixed methods study. Most research about the impact of YouTube on loneliness and/or mental health focused on different types of use, although information sharing and education use were the main types of use investigated. Several authors have discussed the same phenomenon in the cases of Chinese Americans [60,65], BPD [67,79,81] and students [26,37,59,68,69]. Overall, there were slightly more reports on the negative mental health impacts of YouTube use [31,37,59,68,71,73,75,80] compared with the positive impacts [24,57,58,67,69,77], although some studies reported on both positive and negative impacts [26,32,82]. There was a gen-

eral lack of conclusive findings on whether there is more of a negative or positive mental health impact. For example, higher levels of loneliness were reported to be associated with YouTube use [63,71] and vice versa [75]. However, there are concerns about YouTube's recommendation algorithms, which could better present safe and accurate information on suicide [66,70,72,73,83]. It may be perceived that previous systematic reviews weaken the potential originality of the current study. However, the subject is so complex and heterogeneous that we are of the view that an updated review enhances and fulfils the previous results and discussion. Therefore, this review contributes to discourse on the topic and directs to further research on technology-based interventions to improve mental health.

This integrative review supports the previous review findings of collaboration being needed between practitioners, patients, their families, and computer industry experts [22]. There is also support for the potential of YouTube to increase awareness of and access to mental health screening and services for vulnerable adolescents [24]. However, there is no evidence to suggest an association between adolescents' digital technology use and an increase in mental health problems [74]. For improving YouTube's psychosocial impact, we suggest following the WHO recommendations of getting political support, improving research and evidence for what works in treating loneliness and mental health issues, and scaling up effective interventions [44,52]. Although there is currently a lack of effective interventions, there is a good potential for follow-up studies to build upon early evidence. For example, an RCT could investigate help-seeking and mental health literacy from information sharing on YouTube in the athletic population [78].

6.2. Limitations

No causal association was established between the use of YouTube and loneliness/mental health issues because of the heterogeneous findings and the difficulties of quantifying mental health. A potential limitation is that insights from studies that investigated the use of social media networking sites (e.g., Facebook and Instagram) were not included [86,87]. YouTube was focused on because it is primarily a video sharing platform, although it has some social media functionality and therefore, several studies in the synthesis included these platforms together.

6.3. Future Research

Future research may benefit from differentiating between active social media use (ASMU) and passive social media use (PSMU). ASMU focuses on one-on-one exchanges between users in posts or private messaging whereas PSMU involves monitoring of others' online presence through scrolling or looking at profiles, essentially not engaging with other users [88]. To understand positive and negative outcomes (e.g., happiness and depressive symptoms), an assortment of operationalizations of ASMU and PSMU were analyzed [89]. Although accounting for time in ASMU and PSMU prevented a meaningful conclusion, Valkenburg et al. suggested seeking an understanding of the characteristics of the content (e.g., the valence), its senders (e.g., preexisting mood), and receivers (e.g., differential susceptibility).

Future studies should focus on using theory-driven approaches and developing existing approaches to improve the field. However, there are challenges in integrating psychological theory in the design of digital technology to assist in efficacy, technology acceptance, and continued use. This is because of the fundamental issue of trying to find a working balance between traditional and modern research methods (i.e., hypothesis-driven research compared with pattern-based methods, such as NLP used in AI) [50]. We suggest that future research incorporates searches on technology-focused databases and search engines (e.g., ACM Digital Library and IEEE Xplore, respectively) to consider novel research and concepts. We also suggest that different types of researchers work together on proof-of-concept or protocol papers to further establish challenging research. For example, technology-enabled solutions and mental health researchers may connect through multidisciplinary, open-access, open peer review, scientific publishing platforms (e.g., Qeios preprints) to enable various experts to liaise on suggestions. Special issue papers in journals

may also help to align a common aim and tasks in providing interventions for safe and appropriate mental health content on YouTube.

A key challenge for informatics researchers is overcoming AI and algorithm bias. A 2019 study defined AI and algorithm bias as the application of an algorithm that mixes current inequities in socioeconomic status, race, ethnic background, religion, gender, disability, or sexual orientation and amplifies inequities in health systems [90]. A 2022 review suggested that building data-science applications for mental health requires training scientists in applying fair-aware AI methodologies to mitigate bias [11]. However, providing a more stable introduction to safe and appropriate mental health content on YouTube is complex because of the challenges in providing a coherent understanding of the chaotic nature of mental health. For example, informatics researchers are in the process of quantifying mental health (QMH) with key Content-Directed AI technologies based on Ontological Engineering integrated with a World Knowledge DataBase (WKDB) necessary for the understanding of mental health [91]. Based on control theory, a key feature of QMH is providing insight to questions about mental health through a reference model architecture for an intelligent system including a Knowledge Database, World Modeling, and Sensory Processing.

Another key challenge for the informatics domain is to derive insights on providing interventions for safe and appropriate mental health content on YouTube. A recent systematic review found that health-related information on YouTube is unreliable in terms of quality indications based on metrics, such as the number of views and likes [92]. Instead, Osman et al. suggested that YouTube improve its ranking and recommendation system through giving higher weight to expert reviews of health-related videos and by including their assessment data in the ranking algorithm. Bantjes suggested that AI complement human-centered approaches to the promotion of adolescent mental health through facilitating therapeutic relationships, enhancing connectedness, and performing DMHI functions in combination with interventions provided by therapists [93]. However, to date, there are no scientific studies that have demonstrated AI helping people with mental health care. A recent media report described how ChatGPT, an AI chatbot based on Open AI's GPT-3, creates human-like texts based on prompts that are input by a user [94]. It was tested in a DMH service (Koko) using a copilot approach with humans supervising the AI as needed. However, the machine's empathy simulations were not well received by humans. This HCI problem is difficult to overcome when considered alongside ethical and legal concerns from the lack of efficacy and understanding of potential risks.

Several problems hinder the detection and moderation of detrimental content on YouTube. For example, presenting global solutions may not be inclusive of individual and sociocultural differences. However, there is an opportunity for fair-aware AI to progress in sorting out positive and negative connotations in terms of mental health. Likewise, YouTube may devise a vetted mental health expert panel to assess information shared on YouTube for safety, effectiveness, usability, and quality. This assessment could then be considered in combination with other metrics to differentiate between popular and verified information. There could also be a method devised to provide alerts through an independent-of-YouTube algorithmic recommendation system. The user and/or their parent/guardian may be alerted when the limit has been reached in terms of a potential negative impact on mental health with the aim of encouraging moderation. YouTube mental health campaigns focus on promoting public health [56]. There is also potential for health promotion in terms of YouTube use [95]. However, it is a novel concept to design and develop an independent-of-YouTube recommendation algorithm that sources from vetted, safe, and appropriate content or advertisements.

7. Conclusions

Although mostly preliminary evidence, the review found that YouTube use had both a positive and negative impact on loneliness and mental health in a diverse range of users. There were indications of slightly more negative impact reports with the most at-risk group for loneliness and mental health problems being young people (including children,

adolescents, and individuals aged up to 29 years). This group's vulnerability is difficult to protect, despite great efforts to do so by YouTube. The increasing and varying use of YouTube means it is important to understand its effect on users. Studies that analyzed data from objective sources were more likely to suggest a positive effect (e.g., information sharing and peer-to-peer mental health support) and a stronger interest in mental health. In contrast, studies based on subjective reports were more likely to describe higher instances of mental illness in vulnerable individuals. Although there is evidence of an increase in help-seeking through YouTube for mental health concerns, there were significant increases in behaviors such as maintaining parasocial relationships, which are more likely to be associated with negative mental health in vulnerable viewers.

From a public health perspective, YouTube represents a good example of the social and clinical consequences of social media use. Primary prevention is the best strategy to address the problem of safeguarding vulnerable and at-risk individuals. Future vloggers planning to describe loneliness/mental health topics should consider this review to learn from its strengths and weaknesses, adding to the more positive outcomes in mental health, such as peer-to-peer support. Risk awareness is required for vulnerable YouTube users and those responsible for them (e.g., young people and their parents/guardians in addition to health practitioners) regarding some content on suicide being potentially inaccurate or unsafe. For those prescribing YouTube for education use, psychoeducational programs should be created and delivered to fill this gap. However, YouTube is mostly used for personal reasons, such as information seeking/sharing as well as entertainment. There is an unrealized potential to devise strategies for mental health promotion aligned with this use.

There is a good potential of integrating technological, clinical, and family-based solutions for intervening in problematic and risky YouTube use. We propose a concept whereby independent-of-YouTube algorithms aim to detect recommendation bias and errors as well as moderate interventions through recommending safe and appropriate mental health content or advertising campaigns. Therefore, we suggest that informatics and mental health professionals codesign and develop a protocol of an independent-of-YouTube algorithmic recommendation system and pilot a program that steers potentially at-risk users to appropriate content/advertisements with a verified positive mental health/suicide prevention impact. For example, advertisements may be useful for recommending vetted public and/or private mental health resources delivered in a blended model of care.

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Abbreviations

ACM	Association for Computing Machinery
AI	artificial intelligence
BPD	borderline personality disorder
ASMU	active social media use
DMH	digital mental health
DMHIs	digital mental health interventions
DPAVs	depression personal account videos
HCI	human-computer interaction

IEEE	the Institute of Electrical and Electronics Engineers
LGBTQ	lesbian, gay, bisexual, transgender, queer or questioning
ML	Machine Learning
NLP	Natural Language Processing
PSMU	passive social media use
PTSD	posttraumatic stress disorder
QMH	quantifying mental health
RCT	randomized controlled trial
SHWM	#StayHome #WithMe
TV	television
UK	United Kingdom
US	United States
WHO	World Health Organization

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