

# Social Virtual Reality as a Mental Health Tool: How People Use VRChat to Support Social Connectedness and Wellbeing

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## ABSTRACT

Social virtual reality (VR) platforms have increased in popularity with many people turning to these platforms to experience social connection, including a rapid influx of users during the COVID-19 pandemic. However, there is limited understanding of how people appropriate and use emerging social VR applications to actively support their mental health and wellbeing in daily life. Through an online questionnaire and exploratory interviews conducted within the social VR app VRChat during the COVID-19 pandemic, we document how social VR is being used explicitly as a mental health support tool. Participants reported positive wellbeing benefits, mostly attributed to the anonymity provided by avatars and perceived safety within digital worlds and communities of practice. We also report how people use social VR to practice social interaction, reduce negative thoughts and form strong social bonds and connections with others.

## CCS CONCEPTS

• **Human-centered computing**; • **Empirical studies in collaborative and social computing**; **Social Virtual Reality**;

## KEYWORDS

Social VR, Mental health, COVID-19, VRChat

## 1 INTRODUCTION

During the COVID-19 global pandemic in 2020, there was a significant increase in people living in social isolation due to national lockdowns and restrictions on physical interaction and movement [45, 55]. This had a detrimental effect on the mental wellbeing of

people across the world, with many people suffering from “COVID-19 loneliness” [22]. Digital technologies offered a potential solution to this by providing support and facilitating social connection remotely. A study by Türkay et al. found that many people used videogames to cope with the stressors of the pandemic and satisfy their need for social connection [57]. Social gaming platforms were also shown to improve wellbeing and reduce loneliness during COVID-19 [8]. While most research focuses on the mental wellbeing effects of gaming on 2D platforms such as PCs or gaming consoles, a study by Siani et al. found that virtual reality (VR) gamers reported a significant increase in game time and an improved sense of physical and mental wellbeing throughout the pandemic [52]. Siani’s study provided quantitative data demonstrating that VR can promote physical and mental wellbeing and may offer social support to those isolated or lonely.

Social VR platforms present a novel way for gamers to interact and socialize online in virtual environments, via head-mounted displays (HMDs). Similar to virtual games from the 1990s and 2000s such as Active Worlds and SecondLife, social VR apps allow users to navigate virtual lives, form online relationships and explore thousands of virtual worlds. Due to the immersion afforded by the high-end VR headsets used by many VR gamers [5], users have an enhanced sense of presence in the virtual world and can therefore create more authentic relationships with people there [50]. There is currently limited literature investigating how and why people seek out the social benefits and mental wellbeing effects of social VR platforms, despite their growing popularity around the world.

This paper reports on two empirical studies conducted in early 2021 during the COVID-19 pandemic. The first study involved the dissemination of an exploratory questionnaire (n=32) designed to document people’s current use of VR and identify potential links between VR and mental wellbeing. The findings revealed that many VR users associated social VR, specifically VRChat [61], with mental wellbeing improvement. To explore this further, the second study reports on 15 semi-structured exploratory interviews [7] carried out within VRChat.

We report on the use of social VR app VRChat and describe how participants used this application to practise social interaction, reduce negative thoughts and improve their mood and state of mind. By conducting an exploratory interview study to understand how VRChat was used throughout the COVID-19 pandemic, we contribute to the field of HCI, social VR and mental health in two ways. Firstly, we have explored a unique, understudied mental health intervention context and provided empirical data demonstrating how people consciously and explicitly use social VR as a tool to support their mental health and wellbeing. Secondly, we have outlined the

implications of using social VR as a mental health tool to inform future designs and research in this area.

## 2 RELATED WORK

This research explores the roles of social VR in supporting mental health during the COVID-19 pandemic. Therefore, a brief summary of social VR has been provided below, alongside key literature in the field of HCI, mental wellbeing and gaming.

### 2.1 Social Virtual Reality and HCI

Social VR platforms allow users to interact with one another in 3D virtual environments, typically via a head-mounted display. Traditionally, users have interacted with virtual worlds by controlling an avatar in the third person perspective [21]. However, immersive VR allows users to become the avatars that they once controlled, with the body acting as the primary interface between the avatar and the user. This gives users an augmented sense of ownership over their avatars and causes a strong sense of presence within virtual worlds [14].

Social VR has become increasingly popular over the last few years due to advanced VR hardware reducing in cost and thus widening accessibility. Following Meta's announcement of the 'MetaVerse', there has also been an increased awareness of social VR platforms and the potential harms and benefits of such technology [3].

VRChat is considered one of the most popular social VR platforms, with the number of users rapidly increasing over the COVID-19 pandemic to 22,000 users per day and over 4 million total users [48, 64]. VRChat was created in 2014 and has raised over \$95.2 million in investment [63], however remains free for users to play. VRChat is a massively multiplayer online (MMO) social VR application that allows users to interact with one another in a vast range of 3D worlds [61]. Most content found in VRChat is user-generated, meaning members of the VRChat community design and upload virtual 'worlds' for others to visit and interact with. This creates an incredibly diverse and unique space with worlds ranging from rooftop bars to Japanese shrines. There are currently over 50,000 community-generated worlds on VRChat available at the time of writing [64]. Users present as custom avatars - avatars can be selected within the platform or created by the user and uploaded to VRChat via Unity, giving VRChat a unique edge over other social VR platforms that have simpler avatar design and selection processes [30]. VRChat is advertised as a platform to "explore, play, and help craft the future of social VR" [66]. VRChat has been described and categorised by Steam and Meta as a massively multiplayer game [65, 66], however VRChat is less focused on gameplay and more centred around creativity and social interaction. While VRChat offers gaming experiences, the innovative avatar and environment authoring affordances make VRChat a unique, diverse and nuanced social platform. We have therefore drawn on both HCI literature related to the design of mental health tools (i.e. not specific to gaming) and mental health and gaming literature.

To date, social VR studies have mainly investigated the use of avatars, non-verbal communication, harassment, player interaction and engagement [9, 21, 31]. Maloney et al. and Freeman et al. have investigated the engagement of teenagers in social VR

and the complex interactions between children and adults [18, 29]. Researchers have also studied different aspects of the social VR experience including relationship building and the meaningfulness of virtual activities [41]. More recent research has also discussed the various ethical considerations surrounding social VR as a research space and collaboration tool [30]. McVeigh-Schultz has conducted significant research into social VR design and how users interact within social VR [34], proposing a design framework for shaping pro-social behaviour in virtual environments [33]. While the literature continues to grow, social VR scholarship remains largely in its infancy with very little knowledge about the effects of social VR on mental health and wellbeing, particularly compared to the large body of literature surrounding mental health and gaming. Studies relating to social VR and the positive impacts it can provide users have been discussed in more detail below (see section 2.4).

### 2.2 Designing for Mental Health and Wellbeing

There has been a shift in human-computer interaction (HCI) research to reach wider than focusing technology support for mental illness, as "closer consideration of mental wellbeing can increase the effectiveness of mental health interventions, help in preventing mental illness and relapse, and extend our knowledge as to how we can support people to flourish as individuals and enhance their quality of life more generally." [54]. HCI research has continually established that design artefacts can promote positive feelings of happiness and enjoyment, thus improving wellbeing (e.g [54]). However, in recent years there has been a shift in focus towards design for fulfillment and deeper meaning [67]. Peters et al. suggests designing to satisfy the psychological needs of autonomy, competence and relatedness is key to achieving sustained engagement and wellbeing [39]. Peters et al. argue that achieving these two outcomes have been the focus of HCI design strategies for decades, yet the psychological needs have often been ignored. Wiese [67] presents a multi-stage framework for sustained mental wellbeing that incorporates theory from positive psychology, behavioural science and HCI, and is ultimately centred around designing for both subjective and psychological wellbeing. Psychological wellbeing refers to long-term sustainability of positive mental functioning and can be achieved when a person feels true fulfilment, purpose and meaning in their life, whereas subjective wellbeing is associated with short-term positive emotions [4]. Increasingly, there has been the acknowledgement that technology beyond those designed specifically for mental illness can be appropriated to support mental wellbeing, for instance looking beyond evidence-based cognitive behavioural therapy apps to include the "possibility of eclectic therapeutic techniques" [53]. In the real world, people appropriate a range of technologies to support mental wellbeing, including technologies intended for gaming [27, 56].

### 2.3 Mental Wellbeing and Gaming

Gaming has historically been miscategorized as an anti-social hobby considered to have little relevance to the real world [43]. However, an increasing body of evidence has begun to show that gaming can facilitate social connectedness and promote positive mental health [23, 58-60]. Regular engagement with gaming has been shown to decrease stress [42], improve confidence [68] and positively change

mood [59]. Given that males currently dominate the online gaming community and are less likely to seek mental health support [16, 17], online gaming has emerged as a non-traditional method of engaging men with wellbeing enhancing activities.

Online games have become increasingly social, allowing players to benefit from community support and social connectedness. Douglas et al. found that games with social aspects encouraged players to become more social both within games and in the outside world [20]. Work from both Vella and Tyack into recreational online gaming, found that gaming provides players with a sense of autonomy and competence, with social gaming providing high levels of relatedness [58, 59]. This was also hypothesized by Ryan et al. who claimed games were primarily motivating to the extent of fulfilling the basic psychological needs of autonomy, competence and relatedness. These three psychological needs are required to facilitate motivation and promote personal growth, as described by Ryan and Deci's Self-determination Theory (SDT) [46].

## 2.4 Social VR as a Tool for Mental Health

As mentioned above, the impacts of social VR on mental wellbeing are not extensively documented in literature given that the field remains in its infancy. Previous work has however highlighted various ways that social VR has positively impacted users. McVeigh-Schultz provides a qualitative account of social VR developers, highlighting the design features and considerations that go into shaping prosocial interactions in social VR [33]. For example, the positioning of social catalysts and attention focusing objects within social VR environments to "serve as a social lubricant". This demonstrates the intended social nature of social VR platforms, with platforms carefully developed to facilitate and encourage authentic social interactions. Work by Baker and authors has demonstrated the acceptance of social VR as a communication tool for older adults [5]. Prior work in the field of HCI has also shown that embodiment in social VR can improve users confidence and reduce fear of pressured social situations [17]. Researchers have also explored how social VR affects meaningful human relationships [70] and social VR users come to value the social VR community and make friends easily [41].

We hope to build on this previous work, and to the field of HCI, by documenting users' experiences of consciously using a social VR application as a mental health tool, and thus highlighting the significant potential of social VR for providing mental wellbeing support. This research was conducted during a global pandemic when opportunities for social interaction were significantly restricted, and as such amplified the participants' mental wellbeing needs. The presented work builds on the previous research into social VR by providing in-depth data from social VR users describing the role of social VR in alleviating loneliness and isolation during the COVID-19 pandemic. The findings in this study demonstrate that social VR platforms are being appropriated as mental health tools, these findings are particularly important for social VR users, developers and the wider research community and will be discussed in Discussion section 6.2.

## 3 STUDY 1: QUESTIONNAIRE STUDY ON VR, MENTAL WELLBEING AND SOCIAL ISOLATION

The aim of this study was to explore potential links between current VR use and mental wellbeing. This was achieved by designing and distributing an online questionnaire to two established VR online communities. This enabled anonymous engagement with people who were connecting with others online through a shared interest in VR. Ethical approval was granted by our University ethics committee (IRB) before the study commenced.

### 3.1 Method

An online scoping questionnaire was designed and distributed to explore the current use of VR and to identify links between VR and mental wellbeing. The questionnaire included both open and closed questions and was divided into two sections: VR use and personal wellbeing. The VR section asked participants about the VR technology they currently use, their primary use of VR and their favourite VR features, platforms, and games. The second section explored participants' perception of personal wellbeing, including asking how they relax after a tough day and if they have ever associated VR use with mental wellbeing. The questions around mental wellbeing included the use of visual cards, developed by Ayobi et al. [49]. The cards were adapted and used to help participants reflect on their wellbeing and share their views. This section also included asking participants if they engage with any VR apps that affect their mental wellbeing. The participants were asked to provide basic demographic information including age, gender and ethnicity.

*3.1.1 Procedure.* The questionnaire was advertised on the Reddit VR forum [2] and Reddit Oculus forum [1], selected due to being the most popular public VR forums, with over 550 thousand community members combined. The questionnaire took approximately 15 minutes to complete. As an incentive, participants had the option to enter a prize draw for a \$30 USD Amazon voucher.

Responses from the questionnaire were read and categorised using Nvivo 12 qualitative data analysis software (NVivo 12, 2021), initially through open coding. Given the short length of most of the responses, a content analysis was not carried out and instead, an inductive thematic analysis was carried out [11].

*3.1.2 Participants.* 32 participants completed the online questionnaire. Of the 30 participants who disclosed their gender, 24 (75%) were male, 6 (19%) were female. While the participants were disproportionately male, this is largely reflective of the demographics across most VR gaming platforms and is similar to the demographic of participants in the social VR study conducted by Shriram [51]. The age range of participants varied between 18 and 64, with 29 (90%) between the ages of 18 and 45. Participants identified as: Caucasian (26), Latino (3), Asian (2), and having multiple ethnic backgrounds (1).

### 3.2 Findings and Discussion

Two prominent themes were created during the analysis of the questionnaire data: 1) There is potential for recreational VR to improve mental wellbeing; and 2) Social VR applications, especially

VRChat, are associated with social connection and reducing social isolation.

21 participants reported playing videogames after a tough day. This could be for numerous reasons such as using videogames to relax, escape, socialise or engage in rewarding competitive games. These findings support research claiming that gaming is often used to restore wellbeing after negative life experiences [58] and thus supports the potential for VR gaming to be used as a tool for mental wellbeing. 25 out of the 32 participants reported their primary use of VR was for gaming, with the other participants reporting primary use being entertainment, education and physical exercise. When explicitly asked if participants used any VR apps to reflect on or improve their personal wellbeing, only half (16) said yes, reporting both physical fitness apps such as BeatSaber and SynthRider and social apps such as VRChat and Altspace. When asked if they thought VR could be used to support mental wellbeing during social isolation, 30 participants responded yes, with over half of the participants suggesting social VR applications, including VRChat, as a method of facilitating remote social connection and reducing feelings of social isolation.

As the aim of this study was to identify links between VR and mental wellbeing, particularly in the context of the COVID-19 pandemic, the responses identified social VR apps as impacting mental wellbeing most significantly. The participants in the questionnaire associated social VR platforms, most commonly VRChat, as a method of remotely socialising and connecting with other VR users. To the authors knowledge, there are currently no empirical studies that explore the active use of social VR platforms for supporting mental wellbeing. Given that positive social interactions and connections are positively correlated with mental health and wellbeing [47], identifying whether social VR can be used as a tool to provide social support and impact mental wellbeing could be greatly beneficial.

## 4 STUDY 2: EXPLORATORY INTERVIEW STUDY OF VRCHAT AND ITS ROLE IN MENTAL WELLBEING

The aim of Study 2 was to empirically investigate the use of the social VR platform, VRChat, as a tool for supporting mental wellbeing. VRChat in particular was highlighted by questionnaire participants to have effects on mental wellbeing and to provide a way for users to connect and form relationships. To investigate this further, VRChat was the focus of virtual exploratory semi-structured interviews (n=15). Ethical approval to conduct interviews within VR was granted by the university ethics committee (IRB) before the study commenced.

### 4.1 METHOD

This study involved conducting virtual contextual interviews within VRChat to provide an in-depth exploration of user engagement and the perceived mental wellbeing effects. The interviews were conducted at a time and virtual location chosen by the participants. This ensured participants felt safe and comfortable during the interview, allowing for open and free flowing conversation. Conducting interviews at a location chosen by the participant is common practice amongst researchers, particularly for sensitive interviews [39].

**Table 1: Definition of VRChat Concepts**

Term	Description
Portal	A method of transporting to and from different virtual worlds
Mirror	Feature within most worlds that allows users to see their avatar reflection (same functionality as a mirror in real life)
Offline world	Relating to the physical world outside of virtual reality
IRL	In real life
Avatar	3D character used to communicate and travel around
World	Virtual environment

This practice was therefore translated into the virtual world and proved effective for building rapport with participants.

**4.1.1 Research Context.** This study was conducted in early 2021 during the COVID-19 pandemic. Therefore, the participants and the author were under lockdown restrictions for the duration of the study (February 2021 – May 2021). Lockdown restrictions included, but were not limited to; social distancing, school, college and university closures, mandatory ‘work from home’ orders, limits on social contact and the closure of all non-essential public places [55]. The author conducting the interviews is a UK based female engineering student with experience in VR technologies and gaming. The researcher had not used the VRChat platform before this study. A brief overview of VRChat language specific to the platform is needed to contextualize the findings. Table 1 details common words and their meanings within the context of VRChat.

**4.1.2 Participants.** 15 participants in total were recruited for the interviews from posts on the VRChat discord server and from the online forum Reddit-VRChat [53]. Participants had varied experience in VRChat with length of use ranging from 3 months to 4 years (mean = 1.5 years). Of the 15 participants, 13 were male and 2 female, although predominantly male it is estimated that 82.5% of VRChat users are male therefore this sample was representative of the community [38]. Participants were compensated for the 30-minute interviews with \$5 in Amazon vouchers. Demographic information has been summarized in Table 2, including self-reported ethnicity and gender.

**4.1.3 Design.** The interviews followed a similar methodology presented by Shriram et al. where interviews were carried out within social VR (VRChat) between avatars [51]. This allowed an in-depth exploration into how users engage with VRChat and identify any impacts on mental wellbeing, this also protected the anonymity of the participants. The interviews took place in private worlds so no other VRChat users were present in the interview. The interviews were semi-structured and involved discussions around VRChat use, VRChat social culture, the process of making and meeting friends, the effect of VRChat on behaviour and wellbeing, the avatar relationship, use of VRChat during the COVID-19 pandemic and their experience of the VRChat community. The topic guide was designed based on the findings from Study 1. In Study 1, we

**Table 2: Demographics of Interview Participants**

ID	Age	Ethnicity	Gender	VRChat Experience
1	21	White American	Male	8 months
2	26	White American	Male	6 months
3	19	White British	Male	1 year
4	25	White Turkish	Male	3 months
5	25	White Turkish	Male	4 years
6	30	Latino American	Female	3 years
7	24	African American	Male	1 year
8	28	White German	Male	1 year
9	30	Asian American	Female	3 years
10	42	White Canadian	Male	18 months
11	27	White German	Male	18 months
12	24	White German	Male	3 years
13	36	White Russian	Male	6 months
14	28	White German	Male	1 year
15	26	White American	Male	8 months

found that people related the use of social VR to improving their wellbeing. To explore this further, we asked interview participants about how they engage with VRChat and their motivations for continuing to use VRChat. The interview topic guide can be found in *Supplementary materials*.

**4.1.4 Procedure.** Before conducting the interviews, the first author logged a total of 30 hours on VRChat over a 5-week period. This is equivalent to the hours logged on each platform by Maloney et al. during a participatory observation study across multiple social VR platforms [29]. Maloney advises researchers log time on the social VR platforms they are studying to understand the nuances, features and dynamics of the environments [30]. Most sessions were conducted between 8pm and 12am GMT on both weekdays and weekends as this was considered peak time for social VR [28]. Short voice notes were recorded throughout the sessions to document immediate thoughts and impressions, and written notes were taken after each session. This data was not analysed or reported on in this paper but rather used to inform the interviews and give the first author insight into how people use and experience VRChat.

Informed consent was collected from participants before the interviews took place and they were asked to provide their VRChat username and the world they would like to meet in. Beyond the researcher's voice in the interviews, the participants did not know any personal information about the researcher other than her current research project and experience in VR. This was enough to build rapport with the participants as the author understood and could relate to common VR practises and technologies. Interviews lasted on average 30-45 minutes. The interviews were audio recorded using an external audio-recording device to ensure no data was recorded or saved on the VRChat server. The interviews were immediately transcribed following the interviews.

The first author led the thematic analysis and iteratively shared and refined themes with the second and third authors. Initially, the first author read through all collected data to get a sense of the overall narrative. An iterative open coding was carried out as part of an inductive qualitative analysis [11]. The first author read through

each transcript in full multiple times, highlighting key responses (with a specific focus on responses which provided insight into how VRChat was used during the COVID-19 pandemic and the effect, if any, this had on a participants wellbeing or general behaviour). The transcripts and highlighted responses were compared across participants allowing the responses to be categorised into themes and subthemes. The three authors met regularly during the process of response categorization and grouping to refine and discuss the themes. The aim of this was to understand how participants are currently using VRChat and what effects this has on their wellbeing, particularly during the COVID-19 pandemic.

## 5 FINDINGS

The findings have been presented in three themes, with sub themes within. Firstly, we detail the impact of VRChat on users wellbeing and behaviour, including improved confidence, a reduction in social and general anxiety and an increased sense of happiness and fulfillment. This theme also discusses the impact of VRChat on users both in VRChat and offline. Secondly, we describe the ways in which VRChat was used throughout the COVID-19 pandemic, specifically how VRChat was used to reduce feelings of loneliness and isolation. Finally, we describe how VRChat is being used as a tool for mental well-being, mainly for practicing social interaction and reducing negative thoughts and loneliness. Given that the themes all relate to mental health and wellbeing there is some overlap across themes.

### 5.1 VRChat provided new and safe opportunities for socialisation

This theme provides details of how users experienced improvements in their wellbeing and changes in their behaviour both in VRChat and in the offline world. Firstly, we present users' experiences of becoming more confident when engaging socially with others and experiencing changes in their behaviour and 'wellbeing needs'. This was mainly attributed to the anonymity provided by avatars and the acceptance of the wider VRChat community. Secondly, we outline the ways in which participants' experiences of VRChat as a safe

environment led to a reduction in anxiety and an improved sense of wellbeing. Thirdly, we discuss how the process of making friends and socializing in VRChat was the primary reason participants enjoyed the platform and kept returning. Lastly, we describe how some participants experienced dissatisfaction with their offline lives after using VRChat.

*5.1.1 The use of VRChat led to perceived changes in users' behaviour and wellbeing.* Many participants perceived changes in their manners and conduct since using VRChat. They described behavioural changes, such as becoming more outspoken and being comfortable with initiating conversation and approaching new people: *"I gotta say that VRChat has definitely made me a lot more outspoken, confident and social like in real life and in game stuff like approaching people."* (P12, Male). Participants also highlighted that their 'well-being needs' had evolved during VRChat use. Whereas previously they would not have wanted or needed as much social interaction, they now relied on regular social connection, and they are able to access this every day through VRChat: *"I talk to those guys [friends from VRchat] every day and it's perfect for me since I'm now extroverted so I kind of need that"* (P3, Male). The appropriation of VRChat into their everyday lives gave them a new lens to examine their social priorities with participants describing how they were learning more about themselves through social engagement and exploring different sides of themselves in VRChat: *"I'm not usually the sociable sort of person in real life so I wasn't really out and about before covid but being in VRChat has really let me like explore my extroverted side"* (P15, Male).

Beyond self-reflection and learning more about themselves, participants also described how the use of the technology has made them *"a bit of a different person"*: *"First starting out I was very shy, very socially awkward, not a very loud guy. But nowadays I'm big confident, pretty brave and I like to speak my mind."* (P5, Male). Multiple participants reported that using VRChat had allowed *"exploring my extroverted side"* (P3, Male) and had a lasting impact on their extroversion: *"Like I'm becoming more extroverted as I play this game"* (P15, Male). Participants reported that VRChat allows them to overcome insecurities and as they met more friends, they realised they enjoyed talking openly and sharing more: *"in VRChat it just felt so natural to be able to talk with my own voice and I have never ever been this talkative in my life, but I am actually able to talk to strangers now and open up to them about a lot of things"* (P4, Male). The reasons given by participants for this were that they realised they were only introverted in the offline world due to feeling insecure, being scared or being shy.

Participants explained that avatars help them escape physical insecurities experienced in their offline worlds giving them the confidence to socialise with others: *"So even after the first couple conversations I had with people I got more confident, but I think that is because of the confidence an avatar gives you"* (P5, Male). Without having to worry about their physical appearance, participants reported they could focus on their personality and form emotional connections with users: *"it's like people just talk to your personality rather than your body. So I have a confidence because I'm not insecure about my personality, you know, I'm insecure about my body and that's taken away in here."* (P6, Female). Participants suggested that VRChat was impacting their offline world and making them more

willing to be more talkative and less shy: *"I'll be a little bit introverted in real life then I'll think 'well I guess in VRchat I'm extroverted so why would I, why am I trying to be quieter here in real life?' So it's less that I'm forgetting but more that it's changing how I act in general"* (P1, Male).

*5.1.2 The anonymity and perceived safety of VRChat led to a reduction in anxiety.* VRChat was described by all participants as a safe and risk-free space. One participant described feeling less anxious 'walking around' VRChat worlds because there was no physical threat of danger and the option to immediately travel to another world or block a user, provided a sense of social security: *"And it's safe as well obviously cause you aren't actually going anywhere"* (P6, Female). This freedom and sense of safety was supported by the design of an anonymous social setting, with participants describing the feeling of a safe environment where *"you get a clean slate and you can just be whoever you want to be and nobody really knows any different because you are anonymous"* (P13, Male).

The safety of the anonymous environment allowed participants to be more open with others to explore their social side: *"it's just people talking to people but people are more open here because of that anonymity"* (P9, Female). This anonymity also allowed participant to improve their confidence talking to strangers: *"I've had less confidence in general and I'm very self-conscious but in VRChat I've had social experiences where all of these things I was nervous about are just gone so I get to get used to conversation"* (P1, Male). This sense of safety also allowed participants to share more intimate aspects of their lives, with some participants explaining that VRChat was the first time they had experience talking about their feelings and having emotional conversations with others. They went onto explain how this was an *"added bonus"* (P14, Male) of using VRChat, with some participants being surprised at the improvement in their wellbeing: *"I wasn't really able to talk to people before and I was scared of just going shopping but I feel that has improved by a lot. I didn't expect that to happen but it has and it's a nice side effect isn't it?"* (P11, Male).

Participants described how the anonymity provided by avatars allowed them to have a mental break from their physical bodies, a source of anxiety. Some participants explained how their avatar has made them feel *"more me than me"* (P10, Male). When probed, these participants stated that this meant they felt more comfortable in their avatar persona than their physical self in the offline world. However, this comfort with their virtual selves had impact on their engagement and comfort with their offline world, with some beneficial reduction in anxiety around strangers' judgement of their real bodies: *"I don't really like my looks and my body and stuff but in VRchat I could use a different body to what I look like and I felt really comfortable in this type of body and nobody has to see my real self. ... It has made me realise that maybe strangers in real life aren't that scary too"* (P4, Male).

VRChat also provides a social safety, users reported that the anonymity ensured they do not need to worry about facing offline consequences for blocking or travelling options: *"You know it's nice to know that you're not gonna encounter any danger and any danger you do encounter you can just block the person."* (P3, Male).

*5.1.3 Socialising and creating friendship groups in VRChat improved users wellbeing and reduces loneliness.* Participants reported being

surprised by the kindness and support of other users, which allowed them to more easily make friends in VRChat: *“I thought it would be a lot harder to find someone to talk to but everyone in VRChat is very friendly and kind so it makes it easier to meet people”* (P13, Male). The support from the community is one of the reasons participants reported feeling able to open up about their feelings, as the fear of judgement or rejection is much less than in the offline world: *“people are here for actually chatting and those are the people that are really kind to each other, and they are also looking for friends. And that kindness is what’s got me to open up and get better with my anxiety a lot.”* (P4, Male).

Participants reported that the community has many shy and anxious users so there is a sense of commonality that can help form camaraderie and strong social bonds to other users. Participants described that the common experiences and the acceptance from the community improved their anxiety: *“you don’t have to worry so much and also. . . I’d say that also the people in VRchat, like especially the ones that you get to know, are more accepting, of your opinion, of anything you want to talk about”* (P10, Male). The sense of a community allowed for virtual friendships to develop, and these personal connections were noted as one of the main reasons people continued to come back to VRChat: *“I met the pack [group of friends] and that’s when I really felt connection and when I noticed that I wanna play this all the time.”* (P5, Male). One participant described how their view on loneliness and access to social connection changed with VRChat in their lives: *“you can’t be lonely when you have all these people in these worlds waiting to talk to you.”* (P9, Female). This feeling was shared by other participants who felt VRChat had improved their: *“state of mind”: “it’s definitely helped my state of my mind and like my need for wanting to have people present”* (P6, Female).

**5.1.4 Experiencing dissatisfaction in the offline world due to using VRChat.** While all participants in the study were enthusiastic about their use of VRChat and the mental wellbeing benefits it bestowed (particularly in the context of social isolation caused by the pandemic), there were still unintended consequences to the immersive aspects of social VR. This included potentially unhealthy comparisons between online and offline worlds, with some participants describing feeling dissatisfied with their offline life once becoming accustomed to VRChat: *“there are times I see people and think like ‘oh I wish I could block him or get away right now’ but then you remember you can’t and you have to just put up with them.”* (P11, Male). The inability to use features from VRChat in the offline world was also noted by participants with social anxiety, potentially making it harder to engage in real life: *“I don’t have experience of anything really on the outside world but I think if I were to go out I’d find it hard to not have some of the options like blocking and leaving worlds.”* (P4, Male). Participants described missing features such as transporting away and blocking people in the offline world. Despite the benefit of engaging in social interactions online, those safety features acted like a crutch that was suddenly taken away in the offline world.

## 5.2 The use of VRChat to alleviate loneliness and feelings of isolation during the COVID-19 pandemic

COVID-19 was a time of heightened mental health issues for many people for many reasons, not least because of enforced social isolation. Participants, like many other people, turned to VRChat and used it to improve their mental wellbeing and as an escape from the real world. Participants described contributing to and benefitting from a large support network of VRChat users over COVID-19: *“being able to support people as well as get supported is pretty sweet.”* (P9, Female). The help and support participants received from VRChat during COVID-19 was essential to maintain their wellbeing and allow them to satisfy the need to socialise: *“obviously you can’t go out IRL and just meet people or go see a movie or anything so I’d say VRchat has really helped me in that sense. Like I can now make plans, meet people, socialise and it’s taken away the feeling of isolation and loneliness”* (P1, Male).

Of the 15 participants, 5 started using VRChat during the COVID-19 global pandemic. Of the 10 that were already VRChat users, they all reported an increase in time spent in VRChat since the start of COVID-19. Many participants reported their regular use of VRChat over the past year was motivated by the global pandemic and the quarantine mandates. Participants identified VRChat as a way to stay social and meet other people during legally mandated quarantine and lockdowns that restricted physical interaction and movement: *“when there was talk of quarantine I thought hey I wanna be ready for this shit so made the effort to meet people.”* (P5, Male). Many people were lonely during COVID-19 quarantine periods with VRChat helping to alleviate this loneliness. Participants reported joining VRChat because of: *“Loneliness because of the covid. It is very strict in our country with the covid so I can’t meet my friends so yea I came to the VRchat to talk”* (P13, Male).

As mentioned above, participants reported discovering different parts of themselves and exploring the social aspects of their personality. With participants unable to socialise in the offline world, VRChat allowed for a virtual world in which to socialize and in which to gain social connectedness: *“I mean the thing is that my life became virtual because of covid but then it’ll stay virtual cause of the people”* (P9, Female). The importance of socialising also became apparent to some participants: *“I don’t think I realised until really covid hit about how much I actually like interacting with people”* (P10, Male). VRChat therefore became a means for users *“to feel less alone”* (P7, Male) and satisfy their craving for social connection or needing a social outlet: *“the help it’s given me during this time [COVID-19] of. . .scratching that social itch has been immense and I’m very grateful for it”* (P1, Male). Some participants even discussed how the feeling of offline loneliness is something that connects users in VRChat, as they find *“[isolated] people like me”* (P4, Male) and they share these experiences: *“we are all lonely so we all want to talk and it’s nice you know it’s awesome”* (P13, Male). The people they met and connected with were in similar situations to them with regards to shyness and confidence, and their connections and shared experience with other users has parallels to group therapy approaches to mental wellbeing.

For participants who used VRChat before the pandemic, they reported changing their use and becoming more reliant on it than

before. For example, participants discussed how they used VRChat for gaming and having fun prior to the pandemic, but now that they were socially isolated, they use it ‘more seriously’ and engaged with a lot more people than before: “I was only really on it for the games before covid but now it’s for the people.” (P11, Male). Participants reported an increased use of VRChat during lockdown periods and a reliance on the app to improve their mood and wellbeing: “I’ve been stuck at home for the entirety of the year so I’ve basically only been on here and I’ve gotten on here to meet new friends. . . VRChat definitely has changed my way of meeting people and being social” (P8, Male). Participants also discussed how VRChat brings positivity into their life despite being in mandated isolation: “I’ve just been on a rocket and met really pretty people and it gives you something to think about and to look forward to and at times where there’s nothing to look forward to then that feeling means a lot.” (P9, Female). In a period of enforced isolation and social distancing, this technology was appropriated for mental wellbeing support by an increasing number of users.

Some participants linked lowered anxiousness and the relief of loneliness through their use and appropriation of VRChat into their everyday lives during the pandemic. Previous unhealthy habits such as overeating to counter loneliness could be replaced by instead socializing in an environment that did not exacerbate social anxiety: “it’s really scratched my loneliness itch even though I’m super anxious I get lonely like if there is no one present or talking to me I just start eating myself alive so being able to just hop on and see people, even if its people I don’t know, has made that a lot easier” (P6, Female). All the participants reported the personal social benefits of VRChat with most highlighting they have felt a reduction in loneliness: “in VRChat it’s kind of easier to not be so lonely” (P13, Male).

### 5.3 VRChat used as an explicit mental health and wellbeing tool

VRChat became a tool for mental well-being because it provided a safe space for the participants, where they did not feel emotionally or physically threatened. Participants were able to practice social interaction and improve their social skills. Aspects such as mirrors and glitches scaffolded social interactions so they were not as scary, and participants’ comfort and familiarity with them allowed them to talk to others. Participants reported explicitly logging in to improve their mental well-being, and in one case, to explicitly reduce the possibility of self-harm. While the findings reported above have detailed the many ways in which VRChat impacts users mental health and wellbeing, this theme describes the ways in which VRChat was deliberately and consciously used as a tool for mental health and wellbeing by participants.

**5.3.1 The use of VRChat as a tool to improve wellbeing and reduce negative thoughts.** Beyond the implicit implication that the reduction of isolation and loneliness was beneficial to mental health, some participants explicitly stated they use VRChat as a method for improving their wellbeing, giving them something to look forward to and reducing loneliness: “I definitely use it for an improvement to wellbeing like having somewhere to go Friday and Saturday evenings and hanging out with people uhm it’s definitely and always something I can look forward to during the week, so yeah it’s definitely something that improves my wellbeing.” (P7, Male). VRChat was viewed as a

tool for participants to remedy low moods and boredom: “I’d say it’s definitely something I know I can go to when my mood is low or when I’m just bored and like need that social side of things.” (P1, Male). The benefits of using social VR helped participants feel better about their offline lives, however some participants noted this was not their only motivation for use, describing their use of VRChat as an escape from the offline world: “whilst I do use it as an escapism like most people I know that it’s doing good things for me in the real world too so there’s like 2 motivations to come in here.” (P10, Male)

In some cases, participants described that VRChat had reduced negative or potentially self-harm inflicting behaviours: “I will be straight up. I probably wouldn’t still be around if it wasn’t for this game. I deal with a lot of my own personal issues IRL and having a bit of a lifeline to just these people that I can just talk with and not be judged for what I am just is a really enjoyable thing” (P5, Male). Talking to other users about emotions and feelings was described by most participants in this study, with one participant describing how this led to seeking support in the offline world: “In here I’ve been talking to people about how I’ve been feeling outside for a long time and after doing that for so long I then found confidence to get a therapist and start the work” (P10, Male). The support and positivity from the community was often described as the primary motivation for users returning to VRChat: “When you get nice interactions, they just keep coming and I have started to play VRchat every night for like 6 hours from that point.” (P4, Male). Participants described that once they had met friends and made social connections, they experienced a more positive mental state and then began using VRChat as a method of improving their wellbeing: “I got to see the social benefits and now yeah I would say I use it to improve my mood” (P14, Male).

**5.3.2 Using VRChat to practice social interaction.** Participants were using VRChat as a means to self-reflect and learn about themselves, particularly around social aspects of their personalities. Participants were able to practice and hone these social skills as they became more comfortable with the cultural context. Participants described having to practice approaching strangers in VRChat, with one participant describing using the “*trial and error method*” (P8, Male) to learn the best ways to start and maintain conversations and overcome anxieties surrounding social interaction. This was also described by a participant that visits virtual bars and clubs to practice socially interacting: “It’s also something that you like can practise for example walking into a bar lobby where there’s 30 people walking around and you can around and just practise talking to people” (P10, Male). Practicing social interactions was possible in VRChat in a way that wasn’t possible in their offline worlds, as there was the safety of anonymity and the ability to transport immediately to another world if the social interaction did not go as planned.

The ability to pick and choose interactions and experiences within VRChat led to participants feeling “*spoiled by VRChat*” (P6, Female) as they could immediately block users they did not want to interact with. Some participants noted that this avoidance behavior was not something they felt positive about: “I don’t like conflict so my big things is like I wouldn’t want to stand up and address someone but in VR you just go block and then I’d no longer see the situation, I

*don't love the concept of just like hiding it but at least it lets me it lets me enjoy my space."* (P10, Male).

Given the inherently social nature of VRChat, participants reported having the confidence to approach strangers: *"I know other people are here to socialise so it's less intimidating talking to a stranger"* (P7, Male). There were also design features, in VRChat that allowed participants to practice social interactions more easily. Beyond the ability to travel immediately away from a situation, there are features that created a less pressured environment to encourage interaction. For example, there are mirrors in most of the worlds found in VRChat. The mirrors allow avatars to see their reflection and are used in multiple ways to enhance gameplay and social interaction. Participants described using mirrors as a method of easily interacting with others: *"So you walk in you go to a mirror then you just start chatting and see if anyone else at that mirror talks back, easy"*. (P8, Male). The mirrors are also considered a common feature across VRChat worlds providing a sense of safety through familiarity: *"it's a feature that like unites worlds I guess and you just sort of know what to expect at a mirror so it's safe you know"* (P8, Male). These features gave the participants the confidence to overcome their fears of socialising and practice starting and maintaining conversations.

## 6 DISCUSSION

This study has provided insight into how people actively and consciously use VRChat as a mental health tool to alleviate loneliness and support their mental health and wellbeing. We found that participants identified VRChat as a tool to alleviate feelings of loneliness and isolation throughout the COVID-19 pandemic. The findings outline how social VR users could experience a deep sense of connection with other users and in turn become more confident individuals, which is similar to previous social VR studies [17, 41]. The social connection experienced by all of the participants in this study motivated their continued use of the platform and improved their wellbeing, as many described feeling more confident and sociable in real life as well as in social VR. The findings in this study advance our current understanding of how people engage with social VR platforms by providing accounts of how VRChat is used explicitly and deliberately as a mental health tool. The implications of these findings in the context of HCI literature are discussed below.

### 6.1 Social VR as a form of non-traditional CBT

We have reported on the various ways that participants explicitly use VRChat as a tool for improving their mental health and wellbeing. Specifically, we found participants that described themselves as shy and anxious reported using VRChat to practice social interaction. VRChat can therefore be considered a non-traditional method of providing cognitive behavioural therapy (CBT) for people who are shy or anxious. VR exposure therapy is a CBT method commonly used in the treatment of anxiety [10, 13, 19]. The concept of VR exposure therapy is to present a feared scenario or situation and then present a realistic outcome to the scenario, often disproving an irrational feared outcome [12]. Continual exposure to the feared environment can reduce anxiety over time. For successful and safe VR exposure therapy, environments must be controlled and safe

so as to not cause distress [32]. In many ways VRChat provides a platform for people with social anxiety to continually be exposed to their fear of socializing in a safe manner. VRChat users have the ability to block other users, immediately transport to another world or exit the game entirely. Participants in this study that reported suffering from social anxiety, also reported being able to practice social interaction in VRChat which led to them trusting others and socializing, in some cases for the first time in their lives. Some of which went on to describe now feeling more confident in social situations in the real world. The process of being able to practice social interaction is aided by design features in Social VR (Mirrors as described in Findings). This suggests that participants were using VRChat to engage in a version of exposure therapy and reduce their anxiety by repeatedly exposing themselves to social situations that they fear in the offline world. This is an exciting avenue worth exploring in much greater depth as the ability to provide accessible and safe support to people with social anxiety, who very rarely seek support, would have enormous benefit. This also further demonstrates the extent to which VRChat can be used as a tool for mental wellbeing. There are however significant risks associated with appropriating VRChat as a mental health tool when this is not the explicit intended use of the platform. Particularly for users who become solely reliant and dependable on VRChat as a social outlet and wellbeing tool, as was the case for some participants in this study. The risks and implications of this have been discussed below.

### 6.2 The implications of VRChat being used as mental health tool

The findings from this study demonstrate how social VR can be used to facilitate and promote strong social relationships between users, leading to perceived improvements in mental health and wellbeing. The benefits of social connection and support have been well documented in the field of psychology and mental health, with social VR presenting as a platform for people to experience these benefits virtually and remotely [24]. This was particularly advantageous during the COVID-19 pandemic when many people around the world were isolated and under quarantine restrictions. It is therefore not novel or surprising to find that people benefit from socially interacting with others in VRChat, with previous work reporting similar findings [5, 16, 17, 41]. Interestingly however, this study has highlighted that during the COVID-19 pandemic, VRChat was being used explicitly and deliberately as a tool for improving mental health and wellbeing, helping users to alleviate feelings of loneliness and isolation. From previous work, we know that the use of social VR and embodiment lead to positive impacts on users, however no studies to date have provided accounts of how people explicitly use VRChat as a tool to improve and maintain their mental health. This finding has important implications for social VR users, developers and the wider research community.

Firstly, social VR users in this study were extremely enthusiastic and positive about their use of VRChat as a mental wellbeing tool, with some participants explaining it is the only place they can talk about their feelings and manage their mental health and wellbeing. This was particularly true for participants who described being shy or having social anxiety. While it is positive that these participants

have found a way to improve their wellbeing and mental health, we must consider the potentially harmful effects of using social VR as a primary method of socialising and improving mental health. For example, the use of social VR, where users are anonymous, could be viewed as a method of escapism and avoidance from the offline world. While a certain level of escapism can be positive and allow people to take a break from their lives, it can also lead to negative patterns of behaviours and consequences for their mental and physical health, as previously documented [25, 35]. If social VR users become dependent on social VR as a coping mechanism for real life, they may be more susceptible to problematic and addictive use of social VR platforms. This phenomenon has been extensively researched in psychology and gaming literature, whereby the instant gratification of online gaming and socialising is considered superior to that in real life. Less is currently known about the dangers of problematic and addictive behaviours of social VR platforms. Given that most participants in this study were unable to socialise in real life (due to the COVID-19 pandemic), it remains unknown how their use of social VR will change or evolve after the COVID-19 pandemic and the effects this will have on their mental health and wellbeing.

For social VR developers, understanding how social VR platforms are currently appropriated is essential to ensure adequate affordances and safety features are considered. There is currently significant disruption in the social VR landscape, due to the announcement of Metas 'Metaverse', with uncertainty as to how the field will change in the coming years. We therefore must ensure that as the VR field evolves, we consider how these apps are being used and the effects future development could have on these users. As discussed in Related Work (section 2.4), social VR platforms are designed carefully and methodically, to facilitate and enhance social interactions [33]. Moving forward, this must remain a priority and focus, and social VR developers must consider and be aware of how their platforms are being used.

For the HCI research community, social VR remains a novel field of study with much still to be understood about the experiences of how different user groups interact and appropriate social VR. HCI researchers should follow advice from Maloney [14] who outlines the ethical considerations and future directions for social VR as an emerging research space. We found spending ample time on VRChat an essential and insightful part of this work and strongly recommend researchers in this field do the same to gain empathy and insight into the nuances and culture of the social VR platform intended for study. Researchers should also be considerate of the social VR environment when conducting research given that many users rely on the safety and anonymity of the space to improve their mental health and wellbeing. Below, we now discuss how the design of social VR draws parallels to the design of tools for mental health and wellbeing.

### 6.3 Social VR integrates theory from behavioural science, positive psychology and HCI to promote mental wellbeing

VRChat as a mental health tool draws comparisons to many tools that have been specifically designed for supporting mental health

and psychological wellbeing [40, 54, 67]. For example, HCI researchers have been addressing challenges relating to engagement with online therapy interventions that aim to promote psychological wellbeing [54], with research suggesting that the implementation of specific design strategies can enhance user engagement and reduce attrition rates with online therapy interventions. These design strategies include: (1) increasing interaction opportunities; (2) providing immediate feedback; (3) increasing personalization; (4) offering remote therapist support; (5) building a social community; and (6) employing 'relational agents to engage the user in an empathic dialogue'. Most of these design strategies can be observed in VRChat, where users have an infinite number of potential interactions (worlds, features within worlds and users); they talk in real-time therefore feedback is immediate; the more a user engages the more friends they make; and there is a community of nearly four million users that offer constant and immediate support. It is therefore not surprising that many participants in this study reported using VRChat to improve their mental wellbeing and experience personal growth. This study provides qualitative evidence that VRChat can and is being used as a mental wellbeing tool, with users not only benefitting from social interactions and gameplay, but also experiencing the benefits of having open and honest conversations with others.

This could have substantial benefit for men's mental health and wellbeing specifically, given that males currently dominate VRChat and have historically struggled to express their emotions and seek mental health support [36]. Support seeking is often avoided due to stigma, the fear of judgement, not having adequate social connections or being unable to access help [17]. Social VR overcomes many of these factors by offering a non-traditional and subtle way of engaging men with mental wellbeing support in an accessible way that can be integrated into everyday life. The anonymity, afforded by avatars, allows users to speak without fear of 'real life' repercussions or judgement. This can also provide the confidence that many males lack in real life to reflect on and discuss their feelings. Participants in this study were majority males (average age = 28) and they discussed how the anonymity and safety provided by VRChat allowed them to open up about their personal lives. This led to experiencing the benefits of talking about their feelings and being supported by others. Many mental health campaigns and digital apps have tried, and failed, at achieving this [44]. Social VR could therefore act as a platform for letting men safely and anonymously discuss their feelings and experience the positive impact this has on their mental wellbeing. The findings in this paper therefore contribute to the research on gaming for mental health by presenting VRChat as another gaming platform that has potential to engage men in wellbeing enhancing activity.

*6.3.1 The Role of the VR Avatar.* Avatars have been extensively studied in online virtual worlds [15, 16, 37, 50, 69] and have been shown to play a key role in mediating social interaction and influencing player's behaviour both online and offline. This study has shown that in social VR, avatars bolster confidence, influence behaviour, enhance interactions and users have a strong sense of ownership over their avatars leading to a feeling of physical presence in virtual environments. This is similar to the findings presented by Maloney, Moustafa and Baker [6, 16, 37]. In the context

of wellbeing, avatars improved confidence by providing anonymity. This allowed users to make strong bonds with other users and engage in open conversation. This somewhat contradicts current literature that suggests anonymity provides emotional distance in online interactions [37]. However, there is significant research demonstrating the social benefits of anonymity for gamers that experience social anxiety and shyness in face-to-face interaction [26]. Given the introverted nature of most of the participants in this study, this may account for the reason that anonymity enhances social connection.

## 7 LIMITATIONS AND FUTURE WORK

The study reported has several limitations. Firstly, the study only investigated the Social VR application VRChat. VRChat is currently the most popular social VR platform on Steam, however, it is not representative of all Social VR given the individuality and different activities offered by mainstream Social VR platforms. Further research exploring other Social VR platforms such as AltSpaceVR, Rec Room and Meta Horizon Worlds is required to assess if the findings in this study are generalizable to all Social VR or are specific to VRChat.

Social VR scholarship is still in its infancy and significantly more research is required to fully understand the consequences of Social VR on mental wellbeing. There is very little known about the long-term psychological impacts of having a ‘virtual social life’. Understanding this is necessary to clearly identify whether Social VR can affect wellbeing both online and offline. This is also required to ensure that Social VR does not cause harm to users or encourage addictive behaviours. A promising research direction is to conduct mixed methods studies based on VRChat logs and experience sampling measures to investigate whether these mental wellbeing improvements and behaviour changes translate into the offline world. A mixed-method study with a broader and more diverse range of participants would also provide insight into how social VR impacts users mental health, and how different types of user groups are affected.

## 8 CONCLUSION

We have presented two empirical studies that support the use of social VR as a tool for mental wellbeing. Through an exploratory questionnaire, VR users identified social VR platform, VRChat, as a method of receiving social support during the COVID-19 pandemic, reducing isolation and loneliness. This inspired a second study that included contextual virtual interviews within VRChat.

The findings in this paper indicate that VRChat is being used explicitly by people as a tool for mental health. Through the anonymity provided by avatars and the safe and supportive community of users, participants reported building strong social connections with other users and feeling motivated to engage in open and honest conversations about their feelings.

This study therefore makes two key contributions to the field of social VR, gaming, and mental health. Firstly, by exploring a unique, understudied mental health intervention context we have identified that social VR, specifically VRChat, was recognised and used as a way of alleviating loneliness and isolation during the COVID-19 pandemic. Specifically, we have demonstrated how people use

social VR to practice social interaction, reduce negative thoughts and form strong emotional bonds with others. Secondly, we have outlined the implications of using social VR as a mental health tool to inform future designs for mental health interventions.

Further research on the long-term impacts of a ‘virtual social life’ is warranted, particularly in the context of growing interest in Social VR at scale, as Social VR presents an exciting avenue for the field of mental health and wellbeing.

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## REFERENCES

- [1] The Oculus Subreddit. Retrieved April 30, 2021 from <https://www.reddit.com/r/oculus/>.
- [2] Virtual Reality. Retrieved September 15, 2022 from <https://www.reddit.com/r/virtualreality/>.
- [3] Ryufath Soepeno. 2021. Metaverse: A Potential Threat to Humanity and Ethics. <https://doi.org/10.13140/RG.2.2.25540.14726>.
- [4] Paola Iannello, Angela Sorgente, Margherita Lanz, and Alessandro Antonietti. 2021. Financial Well-Being and Its Relationship with Subjective and Psychological Well-Being Among Emerging Adults: Testing the Moderating Effect of Individual Differences. *Journal of Happiness Studies* 22, 3: 1385–1411. <https://doi.org/10.1007/s10902-020-00277-x>.
- [5] Steven Baker, Ryan M. Kelly, Jenny Waycott, Romina Carrasco, Thuong Hoang, Frances Batchelor, Elizabeth Ozanne, Briony Dow, Jennifer Warburton, and Frank Vetere. 2019. Interrogating social virtual reality as a communication medium for older adults. *Proceedings of the ACM on Human-Computer Interaction* 3, CSCW. <https://doi.org/10.1145/3359251>.
- [6] Steven Baker, Jenny Waycott, Elena Robertson, Romina Carrasco, Barbara Barbosa Neves, Ralph Hampson, and Frank Vetere. 2020. Evaluating the use of interactive virtual reality technology with older adults living in residential aged care. *Information Processing and Management* 57, 3. <https://doi.org/10.1016/j.ipm.2019.102105>.
- [7] Louise Barkhuus, Elizabeth Bales, and Lisa Cowan. 2017. Internet Ecologies of New Mothers: Trust, Variety and Strategies for Managing Diverse Information Sources. *Proceedings of the Annual Hawaii International Conference on System Sciences* 2017-January: 2283–2292. <https://doi.org/10.24251/HICSS.2017.276>.
- [8] Matthew Barr and Alicia Copeland-Stewart. 2022. Playing Video Games During the COVID-19 Pandemic and Effects on Players’ Well-Being. *Games and Culture* 17, 1: 122–139. <https://doi.org/10.1177/15554120211017036>.
- [9] Lindsay Blackwell, Nicole Ellison, Natasha Elliott-Deflo, and Raz Schwartz. 2019. Harassment in social virtual reality: Challenges for platform governance. *Proceedings of the ACM on Human-Computer Interaction* 3, CSCW. <https://doi.org/10.1145/3359202>.
- [10] Robillard Genevieve Bouchard, Stephane, Dumoulin Stephanie. 2020. Virtual reality compared with in vivo exposure in the treatment of social anxiety disorder: a three-arm randomised controlled trial. <https://doi.org/10.1192/bjp.bp.116.184234>.
- [11] Virginia Braun and Victoria Clarke. 2012. Thematic analysis. *APA handbook of research methods in psychology, Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological.*: 57–71. <https://doi.org/10.1037/13620-004>.
- [12] Daniel Freeman, Sarah Reeve, A Robinson, Anke Ehlers, David Clark Bernhard Spanlang, and Mel Slater. 2017. Virtual reality in the assessment, understanding, and treatment of mental health disorders. *Psychological medicine* 47, 14: 2393–2400. <https://doi.org/10.1017/S003329171700040X>.
- [13] Wenrui Deng, Die Hu, S. Xu, Xiaoyu Liu, Jingwen Zhao, Qian Chen, Jiayuan Liu, Z. Zhang, Wenxiu Jiang, L. Ma, X. Hong, Shengrong Cheng, Boya Liu, and Xiaoming Li. 2019. The efficacy of virtual reality exposure therapy for PTSD symptoms: A systematic review and meta-analysis. *Journal of Affective Disorders* 257, 698–709. <https://doi.org/10.1016/j.jad.2019.07.086>.
- [14] Trevor J Dodds, Betty J Mohler, and Heinrich H Bü Lthoff. 2011. Talk to the Virtual Hands: Self-Animated Avatars Improve Communication in Head-Mounted Display Virtual Environments. <https://doi.org/10.1371/journal.pone.0025759>.

- [15] Nicolas Ducheneaut, Ming Hui Don Wen, Nicholas Yee, and Greg Wadley. 2009. Body and mind: A study of avatar personalization in three virtual worlds. *Conference on Human Factors in Computing Systems - Proceedings*, May: 1151–1160. <https://doi.org/10.1145/1518701.1518877>.
- [16] Guo Freeman, Alexandra Adkins, Samaneh Zamanifard, and Divine Maloney. 2020. My Body, My Avatar: How People Perceive Their Avatars in Social Virtual Reality. *CHI 2020*. <https://doi.org/10.1145/3334480.3382923>.
- [17] Guo Freeman and Divine Maloney. 2021. Body, Avatar, and Me. *Proceedings of the ACM on Human-Computer Interaction* 4, CSCW3: 1–27. <https://doi.org/10.1145/3432938>.
- [18] Guo Freeman and Andrew Robb. *Stay Connected in An Immersive World: Why Teenagers Engage in Social Virtual Reality*. Association for Computing Machinery. <https://doi.org/10.1145/3459990.3460703>.
- [19] Azucena Garcia-Palacios, Hunter G. Hoffman, Sheree Kwong See, Amy Tsai, and Cristina Botella. 2001. Redefining therapeutic success with virtual reality exposure therapy. *Cyberpsychology and Behavior* 4, 3: 341–348. <https://doi.org/10.1089/109493101300210231>.
- [20] Douglas A. Gentile, Craig A. Anderson, Shintaro Yukawa, Nobuko Ithori, Muniba Saleem, Lim Kam Ming, Akiko Shibuya, Albert K. Liao, Angeline Khoo, Brad J. Bushman, L. Rowell Huesmann, and Akira Sakamoto. 2009. The effects of prosocial video games on prosocial behaviors: International evidence from correlational, longitudinal, and experimental studies. *Personality and Social Psychology Bulletin* 35, 6: 752–763. <https://doi.org/10.1177/0146167209333045>.
- [21] Mar Gonzalez-Franco and Tabitha C. Peck. 2018. Avatar Embodiment: Towards a Standardized Questionnaire. *Frontiers in Robotics and AI* 5, JUN: 74. <https://doi.org/10.3389/frobt.2018.00074>.
- [22] Jenny M. Groarke, Emma Berry, Lisa Graham-Wisener, Phoebe E. McKenna-Plumley, Emily McGlinchey, and Cherie Armour. 2020. Loneliness in the UK during the COVID-19 pandemic: Cross-sectional results from the COVID-19 Psychological Wellbeing Study. *PLOS ONE* 15, 9: e0239698. <https://doi.org/10.1371/JOURNAL.PONE.0239698>.
- [23] Yemaya J. Halbrook, Aisling T. O'Donnell, and Rachel M. Msetfi. 2019. When and How Video Games Can Be Good: A Review of the Positive Effects of Video Games on Well-Being. *Perspectives on Psychological Science* 14, 6: 1096–1104. <https://doi.org/10.1177/1745691619863807>.
- [24] Louise C. Hawkey and John T. Cacioppo. 2010. Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine* 40, 2: 218–227. <https://doi.org/10.1007/s12160-010-9210-8>.
- [25] Fazida Karim, Azeezat A Oyewande, Lamis F Abdalla, Reem Chaudhry Ehsanullah, and Safeera Khan. 2020. Social Media Use and Its Connection to Mental Health: A Systematic Review. *Cureus* 12, 6. <https://doi.org/10.7759/CUREUS.8627>.
- [26] Rachel Kowert, Emese Domahidi, and Thorsten Quandt. 2014. The relationship between online video game involvement and gaming-related friendships among emotionally sensitive individuals. *Cyberpsychology, Behavior, and Social Networking* 17, 7: 447–453. <https://doi.org/10.1089/cyber.2013.0656>.
- [27] Nancy Lau, Alison O'Daffer, Susannah Colt, Joyce P. Yi-Frazier, Tonya M. Palermo, Elizabeth McCauley, and Abby R. Rosenberg. 2020. Android and iPhone Mobile Apps for Psychosocial Wellness and Stress Management: Systematic Search in App Stores and Literature Review. *JMIR Mhealth Uhealth* 2020;8(5):e17798 <https://mhealth.jmir.org/2020/5/e17798> 8, 5: e17798. <https://doi.org/10.2196/17798>.
- [28] Louise Lynch, Maggie Long, and Anne Moorhead. 2018. Young Men, Help-Seeking, and Mental Health Services: Exploring Barriers and Solutions. *American Journal of Men's Health* 12, 1: 138–149. <https://doi.org/10.1177/1557988315619469>.
- [29] Divine Maloney, Guo Freeman, and Andrew Robb. 2020. A Virtual Space for All: Exploring Children's Experience in Social Virtual Reality. *CHI PLAY 2020 - Proceedings of the Annual Symposium on Computer-Human Interaction in Play*: 472–483. <https://doi.org/10.1145/3410404.3414268>.
- [30] Divine Maloney, Guo Freeman, and Andrew Robb. 2021. Social Virtual Reality: Ethical Considerations and Future Directions for An Emerging Research Space. Retrieved April 13, 2021 from <http://arxiv.org/abs/2104.05030>.
- [31] Divine Maloney, Guo Freeman, and Donghee Yvette Wohn. 2020. "Talking without a Voice": Understanding Non-Verbal Communication in Social Virtual Reality. *Proceedings of the ACM on Human-Computer Interaction* 4, CSCW2: 1–25. <https://doi.org/10.1145/3415246>.
- [32] Jessica L. Maples-Keller, Brian E. Bunnell, Sae Jin Kim, and Barbara O. Rothbaum. 2017. The use of virtual reality technology in the treatment of anxiety and other psychiatric disorders. *Harvard Review of Psychiatry* 25, 103–113. <https://doi.org/10.1097/HRP.0000000000000138>.
- [33] Joshua McVeigh-Schultz, Anya Kolesnichenko, and Katherine Isbister. 2019. Shaping pro-social interaction in VR an emerging design framework. *Conference on Human Factors in Computing Systems - Proceedings*. <https://doi.org/10.1145/3290605.3300794>.
- [34] Joshua McVeigh-Schultz, Elena Márquez Segura, Nick Merrill, and Katherine Isbister. 2018. What's It Mean to "Be Social" in VR? *DIS*: 289–294. <https://doi.org/10.1145/3197391.3205451>.
- [35] Fiordalisa Melodia, Natale Canale, and Mark D. Griffiths. 2022. The Role of Avoidance Coping and Escape Motives in Problematic Online Gaming: A Systematic Literature Review. *International Journal of Mental Health and Addiction* 20, 2: 996–1022. <https://doi.org/10.1007/S11469-020-00422-W/TABLES/2>.
- [36] Jo Mitchell, Kellie Vella, Daniel Johnson, Nicole Peever, Vanessa Wan Sze Cheng, Tracey Davenport, Jane Burns, Ian Hickie, Anne Kyle, Brent Hedley, and Brett Johnson. 2017. MindMax: Using Videogames and Sport to Engage Young Men and Improve Wellbeing. 2nd Symposium Computing and Mental Health.
- [37] Fares Moustafa and Anthony Steed. 2018. A longitudinal study of small group interaction in social virtual reality. *Proceedings of the ACM Symposium on Virtual Reality Software and Technology, VRST*. <https://doi.org/10.1145/3281505.3281527>.
- [38] New World Notes: VRChat Site User Demographics: 430,000 Uniques, Mostly Male and Over 25. Retrieved September 15, 2022 from <https://nwn.blogs.com/nwn/2019/05/vrchat-user-numbers-demographics-social-vr.html>.
- [39] Dorian Peters, Rafael A. Calvo, and Richard M. Ryan. 2018. Designing for motivation, engagement and wellbeing in digital experience. *Frontiers in Psychology* 9, MAY: 797. <https://doi.org/10.3389/fpsyg.2018.00797>.
- [40] Dorian Peters, Naseem Ahmadpour, and Rafael A. Calvo. 2020. Tools for wellbeing-supportive design: Features, characteristics, and prototypes. *Multimodal Technologies and Interaction* 4, 3: 1–19. <https://doi.org/10.3390/mti4030040>.
- [41] Roosa Piitulainen, Perttu Hämäläinen, and Elisa D Mekler. 2022. VIBING TOGETHER: Dance Experiences in Social Virtual Reality; VIBING TOGETHER: Dance Experiences in Social Virtual Reality. <https://doi.org/10.1145/3491102.3501828>.
- [42] Anne M. Porter and Paula Goolkasian. 2019. Video games and stress: How stress appraisals and game content affect cardiovascular and emotion outcomes. *Frontiers in Psychology* 10, APR. <https://doi.org/10.3389/fpsyg.2019.00967>.
- [43] Muhannad Quwaider, Abdullah Alabed, and Rehab Duwairi. 2019. The impact of video games on the players behaviors: A survey. In *Procedia Computer Science*, 575–582. <https://doi.org/10.1016/j.procs.2019.04.077>.
- [44] Simon M. Rice, Rosemary Purcell, and Patrick D. McGorry. 2018. Adolescent and Young Adult Male Mental Health: Transforming System Failures Into Proactive Models of Engagement. *Journal of Adolescent Health* 62, S9–S17. <https://doi.org/10.1016/j.jadohealth.2017.07.024>.
- [45] Hannah Ritchie, Edouard Mathieu, Lucas Rodés-Guirao, Cameron Appel, Charlie Giattino, Esteban Ortiz-Ospina, Joe Hasell, Bobbie Macdonald, Diana Beltekian, and Max Roser. 2020. Coronavirus Pandemic (COVID-19). *Our World in Data*. Retrieved September 12, 2022 from <https://ourworldindata.org/coronavirus>.
- [46] Richard M Ryan and Edward L Deci. 1985. Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being Self-Determination Theory.
- [47] Alexander K. Saeri, Tegan Cruwys, Fiona Kate Barlow, Samantha Stronge, and Chris G. Sibley. 2018. Social connectedness improves public mental health: Investigating bidirectional relationships in the New Zealand attitudes and values survey. *Australian and New Zealand Journal of Psychiatry* 52, 4: 365–374. <https://doi.org/10.1177/0004867417723990>.
- [48] David Saffo, Sara di Bartolomeo, Caglar Yildirim, and Cody Dunne. 2020. Crowdsourcing Virtual Reality Experiments using VRChat. February. <https://doi.org/10.31219/osf.io/w569f>.
- [49] Susan M. Schneider and Linda E. Hood. 2007. Virtual reality: A distraction intervention for chemotherapy. *Oncology Nursing Forum* 34, 1: 39–46. <https://doi.org/10.1188/07.ONF.39-46>.
- [50] Raz Schwartz and William Steptoe. 2018. The immersive VR self: Performance, embodiment and presence in immersive virtual reality environments. *A Networked Self and Human Augmentics, Artificial Intelligence, Sentience*: 108–116. <https://doi.org/10.4324/9781315202082>.
- [51] Ketaki Shirram and Oculus Vr. 2017. All Are We I com e: Using VR Ethnography to Explore Harassment Behavior In Immersive Social Virtual Reality. 5–6.
- [52] Alessandro Siani and Sarah Anne Marley. 2021. Impact of the recreational use of virtual reality on physical and mental wellbeing during the Covid-19 lockdown. *Health and Technology* 11, 2: 425–435. <https://doi.org/10.1007/s12553-021-00528-8>.
- [53] Katarzyna Stawarz, Chris Preist, Debbie Tallon, Nicola Wiles, and David Coyle. 2018. User Experience of Cognitive Behavioral Therapy Apps for Depression: An Analysis of App Functionality and User Reviews. *J Med Internet Res* 2018;20(6):e10120 <https://www.jmir.org/2018/6/e10120> 20, 6: e10120. <https://doi.org/10.2196/10120>.
- [54] Anja Thieme, Jayne Wallace, Thomas D. Meyer, and Patrick Olivier. 2015. Designing for mental wellbeing: Towards a more holistic approach in the treatment and prevention of mental illness. *ACM International Conference Proceeding Series*: 1–10. <https://doi.org/10.1145/2783446.2783586>.
- [55] Timeline of UK government coronavirus lockdowns and restrictions | The Institute for Government. Retrieved August 15, 2022 from <https://www.instituteforgovernment.org.uk/charts/uk-government-coronavirus-lockdowns>.
- [56] Gustavo F. Tondello, Daniel Johnson, Rita Orji, Marierose M.M. van Dooren, Kellie Vella, and Lennart E. Nacke. 2017. Proceedings of the positive gaming: Workshop on gamification and games for wellbeing – Preface. *CEUR Workshop Proceedings* 2055.
- [57] Selen Türkay, Allan Lin, Daniel Johnson, and Jessica Formosa. 2022. Self-determination theory approach to understanding the impact of videogames on wellbeing during COVID-19 restrictions. <https://doi.org/10.1080/0144929X.2022.2094832>.

- [58] April Tyack, Peta Wyeth, and Daniel Johnson. 2020. Restorative Play: Videogames Improve Player Wellbeing After a Need-Frustrating Event. 1–15. <https://doi.org/10.1145/3313831.3376332>.
- [59] Kellie Vella, Daniel Johnson, and Leanne Hides. 2015. Indicators of wellbeing in recreational video game players. *OzCHI 2015: Being Human - Conference Proceedings*: 613–617. <https://doi.org/10.1145/2838739.2838818>.
- [60] Kellie Vella, Daniel Johnson, and Jo Mitchell. 2016. Playing support: Social connectedness amongst male video game players. *CHI PLAY 2016 - Proceedings of the Annual Symposium on Computer-Human Interaction in Play Companion*: 343–350. <https://doi.org/10.1145/2968120.2987734>.
- [61] VRChat. Retrieved May 5, 2021 from <https://hello.vrchat.com/>.
- [62] VRChat. Retrieved September 15, 2022 from <https://www.reddit.com/r/VRchat/>.
- [63] VRChat - Crunchbase Company Profile & Funding. Retrieved September 14, 2022 from <https://www.crunchbase.com/organization/vrchat>.
- [64] VRChat on Steam. Retrieved December 7, 2022 from <https://store.steampowered.com/app/438100/VRChat/>.
- [65] VRChat on Oculus Quest 2 | Oculus. Retrieved December 7, 2022 from [https://www.oculus.com/experiences/quest/1856672347794301/?locale\\$=sen\\_GB](https://www.oculus.com/experiences/quest/1856672347794301/?locale$=sen_GB).
- [66] VRChat - Steam Charts. Retrieved May 5, 2021 from <https://steamcharts.com/app/438100>.
- [67] Lisa Wiese, Anna E. Pohlmeier, and Paul Hekkert. 2020. Design for sustained wellbeing through positive activities—a multi-stage framework. *Multimodal Technologies and Interaction* 4, 4: 1–25. <https://doi.org/10.3390/mti4040071>.
- [68] Nick Yee, Jeremy N. Bailenson, and Nicolas Ducheneaut. 2009. *The proteus effect: Implications of transformed digital self-representation on online and offline behavior*. <https://doi.org/10.1177/0093650208330254>.
- [69] Gunwoo Yoon and Patrick T. Vargas. 2014. Know Thy Avatar: The Unintended Effect of Virtual-Self Representation on Behavior. *Psychological Science* 25, 4: 1043–1045. <https://doi.org/10.1177/0956797613519271>.
- [70] Samaneh Zamanifard and Guo Freeman. 2019. “The togetherness that we crave”: Experiencing social VR in long distance relationships. *Proceedings of the ACM Conference on Computer Supported Cooperative Work, CSCW*: 438–442. <https://doi.org/10.1145/3311957.3359453>.