Exploring behaviour-intention gaps to explain low retention in a community-based video-conferencing intervention for depression: lessons for researchers using technology as interventions

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Abstract

Purpose – This paper aims to reflect on the outcomes of a community-based video-conferencing intervention for depression, predating the COVID-19 pandemic. The study investigates the potential implications of its findings for enhancing adherence to digital mental health interventions. The primary objective is to present considerations for researchers aimed at minimising the intention-behaviour gap frequently encountered in digital mental health interventions.

Design/methodology/approach – A randomised control feasibility trial design was used to implement a telehealth model adapted from an established face-to-face community-based intervention for individuals clinically diagnosed with depression. In total, 60 participants were initially recruited in association with a local mental health charity offering traditional talking-based therapies with only eight opting to continue through all phases of the project. Modifications aligning with technological advancements were introduced.

Findings – However, the study faced challenges, with low uptake observed after an initial surge in recruitment interest. The behaviour-intention gap highlighted technology as a barrier to service accessibility, exacerbated by participant age. Furthermore, the clinical diagnosis of depression, characterised by low mood and reduced interest in activities, emerged as a potential influencing factor.

Research limitations/implications – The limitations of the research include its pre-pandemic execution, during a nascent stage of technological mental health interventions when participants were less familiar with online developments.

Practical implications – Despite these limitations, this study's reflections offer valuable insights for researchers aiming to design and implement telehealth services. Addressing the intention-behaviour gap necessitates a nuanced understanding of participant demographics, diagnosis and technological familiarity.

Social implications – The study's relevance extends to post-pandemic society, urging researchers to reassess assumptions about technology availability to ensure engagement. This paper contributes to the mental health research landscape by raising awareness of critical considerations in the design and implementation of digital mental health interventions.

Originality/value – Reflections from a pre-pandemic intervention in line with the developments of a post-pandemic society will allow for research to consider that because the technology is available does not necessarily result in engagement.

Keywords Mental health, Barriers, Depression, Reflection, Digital intervention

Paper type Research paper

Introduction

Society is in the midst of a digital revolution which shows little signs of slowing. From driverless cars and augmented reality to cryptocurrencies, 5 G and digital assistants, the pace at which new technologies are being developed is difficult to keep track of (De' *et al.,* 2020). As a result of the COVID-19 pandemic the value of communication technology, particularly videoconferencing (VC) applications, became more used as a means of providing telemedicine and supports with an increase in usage of 766% in the first three months of the pandemic (Shaver, 2022). This necessary change to life which included social distancing, social isolating and quarantining, resulted in new opportunities in relation to online service delivery for general health and mental health supports. Initially statutory health and social care providers were reluctant to embrace these advancements in mental health provision (Slone *et al.,* 2021) but post-pandemic this landscape has changed. The importance of digital supports in relation to mental health provisions have been widely acknowledged, with all four regions of the UK including digital strategies within their mental health frameworks (Scottish Government, 2021; www.gov.wales, 2023; GOV.UK, 2022). Digital supports for mental health refer to the use of technology-based tools, platforms, applications or interventions designed to promote mental well-being, provide support and address mental health concerns. These digital supports leverage various technological resources such as websites, mobile apps, wearable devices, virtual reality, telehealth services and online communities to deliver mental health-related information, resources or therapeutic interventions (Bond *et al.,* 2023). This research is set within Northern Ireland which has, within its mental health strategy, a specific theme on digital mental health to "support the traditional delivery of mental health services with new digital methods" (Department of Health, 2021, p. 79). In Northern Ireland 91% of homes can access full-fibre broadband with most individuals accessing the internet solely from a smartphone (76%) (Ofcom, 2023) which has not significantly changed since this research was conducted; therefore, access to the infrastructure should not be seen as an issue within the context of this study. However, barriers to adherence should be considered when planning for the use of a digital technology to mental health conditions such as depression. The current paper is that of a pre-pandemic community-based intervention examining a VC service for adults with depression. The aim is not to demonstrate the feasibility of such an intervention but as a case study on considerations that practitioners should reflect upon before using technologies with clinical populations. The technology may have greatly improved post-pandemic, but the issues often associated with a depressive illness remain constant and as such require understanding to increase adherence and acceptability. Do the findings still hold in a post-pandemic society?

Behavioural intervention technologies

Behavioural Intervention Technologies (BITs) are an umbrella term for technologies used to apply behavioural and psychological interventions to tackle a range of physical, behavioural and mental health difficulties (Hermes *et al.*, 2019). BITs include but are not limited to telephone, Web-based (internet) interventions, interventions delivered via mobile devices, video-conferencing, social media, gaming and virtual reality (Marsch *et al.*, 2014) BITs are a high research priority in light of their many advantages for improving patient access to care (Senbekov *et al.*, 2020; Sandberg *et al.*, 2019) and for reducing costs (Le *et al.*, 2021). BITs have made accessing services easier for those living in rural areas and have also overcome the key barriers associated with face-to-face care reported by both rural and urban dwellers such as distance, and lack of psychological services (O'Kane, 2020). A recent study by WHO (2022) found that despite advancements in technology, inequality in accessing BITS is prevalent across Europe with those from ethnic minorities, older people, and those with language barriers less likely to access these types of supports. The same report found that those with a better level of education and higher economic status were more likely to engage with technology-based services. Within the UK, digital literacy rates are steadily improving; however, Northern Ireland continues to have the highest rates of digital exclusion across all regions with 14.2% of adults non-internet users (Office for National Statistics, 2019). In terms of reducing costs, a systematic literature review by Gentili *et al.* (2022) reported on a growing body of evidence of the cost-effectiveness of digital interventions favourable in both costs and health outcomes while a scoping review by Snoswell *et al.* (2020) supported these findings but that they also resulted in an increased productivity for many services.

In addition to this, there is an acknowledgement with the improvements in technology, for example, better broadband and network capabilities, that the internet can be a valuable self-help resource for those living with depression. A review by Plackett *et al.* (2023) found evidence of a reduction in depressive symptoms when using social media interventions alongside therapy-based interventions such as cognitive behavioural therapy (CBT). The National Institute for Health and Clinical Excellence (NICE) in the UK, which produce evidence-based guidelines, recommend online cognitive behavioural therapy (CBT) for those with mild depression (NICE, 2004). Another form of online self-help is internet support groups (ISGs) where people can access support and information from those with a similar condition (Kobori and Yoshinaga, 2020). Although emerging evidence suggests that ISGs are especially popular for people with depression the evidence base remains weak (Griffiths, 2017) and as such, the full risks and benefits for clinical purposes are unknown (Rayland and Andrews, 2023). Focusing on VC apps, there has been exponential growth in public demand with downloads seeing a 90% increase on pre-COVID levels (Wang and Roubidoux, 2020). As such, even more opportunities for new and innovative service delivery through this medium have been created – particularly for those who are reluctant to seek traditional forms of support (face-to-face), have restricted mobility or live in rural areas (Berryhill *et al.*, 2019; Bell *et al.*, 2020; Butzner and Cuffee, 2021). With this increase in uptake and newer technologies there has been a plethora of research in the area advocating the use of BIPS in health care. It has been suggested that these modes of delivery should now considered as an "alternative" to in-person health care rather than that of complementing in-person healthcare (Annaswamy *et al.*, 2020). Yet, some caution remains regarding the adaptation of these technologies within health care. Numerous potential barriers remain in terms of implementation, adoption, consistency of use and sustainability within health-care organizations and the wider health-care system (Greenhalgh *et al.*, 2017). Failures can occur at many different levels, including the nature of the illness the health technology aims to

address. This is especially pertinent when attempting to treat those with depression, as the nature of depression includes lower motivation, volition (Grahek *et al.*, 2019; Krämer *et al.*, 2014) self-efficacy (Maddux and Meier, 1995) and large variations in mood state (Bowen *et al.*, 2017).

Depression

Approximately 280 million people worldwide suffer from depression, which is a leading cause of disability and overall disease burden globally (World Health Organisation, 2023). A report in 2022 estimated that mental health problems cost the UK economy at least £117.9bn a year (Mcdaid and Park, 2022), increasing strain on services as well as the need to find suitable alternatives. Research has found that COVID-19 pandemic restrictions exacerbated mental health issues for some (Courtet *et al.*, 2020; Cao *et al.*, 2020; Wang *et al.*, 2020) and that post pandemic waiting lists have been reported as unmanageable (Royal College of Psychiatrists, 2021) with people seeking help is at a record high (NHS Digital, 2019). The Centre for Mental Health estimated that almost 20% of the population in England will require new or additional mental health supports as a direct consequence of the pandemic (www.centreformentalhealth.org.uk, 2021). Depression has been reported (alongside mild anxiety) as the most common mental health condition in Britain (www.mentalhealth.org.uk, 2024); therefore, the condition under focus in this research still holds today as one of importance. Research for the treatment of depression has focused on three main areas, namely, psychopharmacological interventions, psychotherapeutic interventions and a combination of these treatments. Psychological interventions for depression may include cognitive behavioural therapies, counselling, interpersonal therapy, behavioural activation, problem-solving therapy, psychodynamic psychotherapy and couples therapy (National Collaborating Centre for Mental Health (UK), 2010). The National Institute for Health and Care Excellence (NICE) suggest cognitive behavioural therapy (CBT), computerised cognitive behavioural therapy (CCBT), behavioural activation and structured group physical activity programmes as particularly effective (National Institute for Health and Care Excellence, 2022).

This article reflects on the lessons learnt from a community based, 8-week VC intervention for adults with depression known as the "DES" project (Developing E-health Services). The DES project was evaluated using a feasibility randomised trial (RCT) design. The aim will be to contextualise the findings of the intervention in line with considerations for practitioners using technology as a treatment for depression and factors that should be addressed to increase adherence with the intervention.

Methods

Background and rationale to the developing e-health services study

The DES project (ClinicalTrials.gov Trial Number: Blinded for review) was informed by the Medical Research Council (MRC) Framework for complex interventions (Craig *et al.*, 2008) and used a randomised controlled feasibility trial design. The intervention took place across three months prior to the covid pandemic. Ethical approval was obtained through the University's School Ethics Committee (Blinded for review). As part of the ethics process all perceived concerns were addressed including confidentiality and its limitations, data storage and distress procedures. Participants were made aware of the steps taken to ensure that their responses/information would be strictly protected as per good practice guidelines and detailed information on informed consent was provided. The PI and main research assistant had both undertaken specific training on good clinical practice with the PI a

qualified social worker with extensive training in risk assessment and group-based interventions with older adults.

Setting
This was a coproduced, community-based intervention using VC technology. It was delivered in partnership with a UK mental health charity and was adapted from their existing face-to-face support group programme. These support groups have been in operation for over 22 years and take place across 24 registered sites. Referrals to the support groups come through several areas but mainly via a GP referral or through a self-referral process to the charity. Most individuals engaged with these services are known to mental health services across the region but there is no pre-requisite to be a member of the charity to access services. This charity delivered the intervention to the participants. By partnering with a local service provider, the research team gained access to wider mental health networks and expertise in which to promote and develop the service.

Intervention development (phase 1). The intervention had two main phases. Phase 1 addressed intervention development and in-house testing as informed by the values and principles of coproduction (Social Care Institute for Excellence, n.d.). Research by Authors (blinded for review) detailed the extensive coproduction steps that were involved to ensure that the research was developed with a solid foundation for implementation. These involved formal team meetings and workshops, internal testing, and workshops to develop the facilitator manual. Findings from a Cochrane Review of randomised controlled trials assessing effectiveness, acceptability and costs of interactive telemedicine (Flodgren *et al.*, 2015) provided the necessary theoretical and empirical evidence to inform the intervention. This review of tele-conferencing technology for mental health support was used to determine if the DES project would be efficacious, safe for participants, and whether the measures chosen were the most relevant.

Phase 1 recruitment and data collection
To inform development and refinement of the intervention, the research team completed formal team meetings ($n = 5$) and workshops ($n = 3$) with service provider staff, volunteers and face-to-face service users. This was achieved using a purposive sampling approach. Qualitative data were gathered to explore potential acceptability of VC support groups, unintended harms, potential barriers to access and suggestions around development. Two observations of face-to-face groups were also undertaken. The development phase included in-house testing of the practical aspects of delivering the intervention. This involved observations ($n = 3$) of staff and facilitators using the technology and interviews ($n = 2$) with staff and facilitators after testing.

A protocol was subsequently produced for facilitators detailing the content of the intervention and how it would be delivered via VC format. This protocol included information on the length of sessions, opening the online space 20 min in advance to allow for potential log in problems or connection issues, and a distress protocol that was to be implemented if a participant appeared distressed or anxious. This full protocol can be found on ClinicalTrials.gov (study blinded for review). A short training programme was delivered by the project research team to enable support group facilitators to familiarise them with the technology and how it should be used.

Intervention delivery and evaluation (phase 2). Phase 2 involved the delivery of VC support groups by staff from the charity provider via Skype and were designed to reflect the structure, principles and core components of face-to-face groups (i.e. psycho-education and peer support).

Recruitment and data collection. Participants were recruited through several avenues, including local press advertisements (radio and newspaper) as well as an active social media campaign (Facebook, Twitter, etc.). In total, 60 participants were recruited via these routes. Those interested in the study were directed towards an online registration page located on the service provider's website. This included additional, written information on the project (information sheets, FAQs) and a short video presentation. Individuals were then invited to give written consent via an online form and complete baseline measures (see below) to register. Inclusion criteria were that participants were 18 years or older, had not previously accessed services through AWARE NI and were not actively suicidal (assessed using screening questionnaire).

Once baseline measures were finalised, randomisation was conducted using random number generation. This was done using an online software tool (randomizer.org). Each participant was assigned a unique individual number which was input into the generator. A block randomisation procedure was applied, blocks of size 5 (3 to treatment group and 2 to control group). Those participants that were selected from the registration list to be included within the intervention arm were invited to join the VC group. This resulted in 36 participants in the intervention group. The remaining registered participants (24) were to act as a delayed entry control group (to receive the intervention at the end of the study). For those selected into the intervention arm, they were invited to attend weekly VC support group sessions lasting approximately 60 min and delivered over eight weeks by experienced face-to-face group facilitators ($n = 2$). An initial target of four to six VC groups were planned to run concurrently with eight participants in each. However, this was revised to three to four concurrent groups of approximately —four to six participants following Phase 1 development work.

At the end of the eight-week intervention period, participants were sent a reminder via email or text to logon to the online registration portal to complete the same validated scales as completed at baseline. In addition, (optional) qualitative questions were asked, for example, comments on the intervention and acceptability. Semi-structured qualitative interviews with intervention group participants ($n = 5$) and group facilitators ($n = 3$) were also conducted either face-to-face or online (via Skype) and lasted between 20 and 45 mins. Interviews explored issues around acceptability of both the intervention and the measures used. Audio recordings of interviews were transcribed verbatim and anonymised.

Outcome measures. Phase 2 outcome measures were recorded online at baseline (registration) and further measures were at week eight and again at six months and included the Patient Health Questionnaire (PHQ-9). Demographic information for example, age, gender, current service use and medication and reasons for signing up were gathered at baseline (including whether mental health services had been accessed within the past year). All data were stored securely using the Joomla Content Management System, known to be one of the most secure open-source CMS's available, which ncludes ACS (Access Control System), enabling only senior staff access to user data, bCryipt Password hashing, SSL and 2 pass deletion. Acceptability was assessed by using semi-structured interviews ($n = 8$) and participant observations with each group observed on at least two occasions ($n = 5$). Problems were recorded on observation sheets as well as any aspects of the service that appeared to be working well.

Data analysis

Descriptive statistics (Phase 2) were used to analyse: dropout rates (as a measure of acceptability of the intervention); outcome compare measures from the intervention and control group (as a measure of the potential for efficacy); number of persons who attempt to

register an interest in the service (as a measure of demand for the service) and group retention (attendance during sessions). No inferential data analyses were performed. Data were analysed using the SPSS version 29.0.1 (SPSS Inc, Chicago, USA). Thematic qualitative data analysis (Braun and Clarke, 2006) across Phases 1 and 2 explored: issues of acceptability (of the intervention and randomisation method); potential advantages and disadvantages of the intervention; practicalities of delivering the intervention; and suitability of recruitment methods.

Waiting list control group
Participants were informed using information sheets (before baseline measures were completed) that a waiting list would be in operation for this service. Persons on the waiting list control group were informed that they could join a face-to-face group at any stage. However, should those on the waiting list access AWARE NI's face-to-face group they would be removed from the study. Those on the waiting list still had access to their own user dashboard following registration and were kept abreast of the likely date in which their group would be starting.

Results
Overall, 60 participants completed baseline measures and registered for the study within the first two weeks of the launch. Community partners executed a targeted social media recruitment strategy two days after the initial launch which appeared linked to an upsurge in registrations over a 48-h period. Other methods used were advertisements on local radio and print media with members of the research team giving interviews and encouraging individuals to register. These approaches appeared successful and were relatively low in cost. However, it would be prudent to look at recruitment and retention as key indicators as to whether the intervention could be deemed feasible. Study retention was low, with 13% ($n = 8$) of individuals who completed baseline measures attending two separate VC support groups. These participants deemed the groups as acceptable but given the high dropout rate these results cannot be generalised to a wider population. After discussion with the research team, it was considered unethical for those in the control group to wait to access support and as such the control group design was abandoned in a bid to increase numbers. Attempts were made to contact those who had failed to attend their first VC support group to determine the reasons (via phone, text message and email). Some had initial connection issues ($n = 2$) but were still keen to access the service. Feedback was obtained from nine individuals who had decided to withdraw with the following reasons given – did not fully understand the nature of the service (e.g. thought it was chat based) ($n = 1$); lost motivation or were no longer interested ($n = 5$); were unable to connect ($n = 1$); decided to attend the face-to-face support groups ($n = 1$); registered for an elderly relative to combat social isolation and realised that they were not suitable soon afterward ($n = 1$). However, for those who attended their first VC group session ($n = 8$) there were no subsequent dropouts suggesting a high level of retention when engaging with the intervention.

Interview data collected from those who completed the intervention ($n = 5$) as well as the facilitators who ran the groups ($n = 3$) captured some additional perspectives on the reasons for low intervention uptake. One VC group member noted:

> I do feel though that you need to be aware of the technology, how it works - and there's a lot of elderly men and women, they're horrified at the prospect of having to learn something new or to maybe manage something technically [VC group member 1].

Mitigation processes were in place prior to the intervention. Orientation sessions were offered to all participants so that they could familiarise themselves with the platform and have any questions answered. Webcams were also provided for those who required them with support given on how to install correctly with one-to-one technological support given.

Group facilitators went further, suggesting that it was also a reflection of the mental health condition, for example:

> [. . .] at the end of the day, you have got to remember too that they're depressed (service users), and if there's [. . .] hiccups with technology and sound and things not working well, if you're depressed, you're more likely to turn off because you may not have the motivation and the interest to maintain it (Service Provider 3)

It was suggested that to ensure that group facilitators were adequately prepared for VC sessions there was too much of a delay between registration and an offer of a place on the VC group (approx. two weeks). This may have resulted in a loss of participant motivation. In the beginning, this delay appeared partly due to facilitator anxiety regarding the delivery of the VC intervention and requests for additional preparation time e.g.:

> [. . .] even if we get everything right from our end, technology-wise and staff are confident, and everything has been ironed out [. . .] it's [still] a technological project, and things can go wrong using technology [Service Provider 2].

As facilitator confidence grew, there were still delays while participants were randomised into the intervention and control groups (e.g. at least four were needed to run a group). To address this, it was agreed that every registrant would been offered an initial one-to-one induction meeting (via Skype) within 24 h of registration. This meeting was scheduled to last 10 min and was used to introduce the group facilitators as well as address any connection issues or answer questions. Following this, retention improved slightly with the commencement of a second VC intervention group. Although it is worth noting that six participants (10%) completed the induction session but still did not attend the VC group. Attempts were made to contact these participants via email but the consent procedure in the initial recruitment information stated that participants were free to withdraw without giving a reason and thus researchers needed to be cautious about being seen as applying undue pressure.

All baseline measures were fully completed by participants ($n = 60$). The primary outcome measure (PHQ-9) revealed a mean score of 18.1 (SD, 5.9) which falls within the "moderately severe" depression range (Kroenke *et al.*, 2001). Unfortunately, there was a poor return of surveys at 8-weeks which means comparison of PHQ-9 scores at the beginning and end of the intervention was not possible. As such, the potential for change within the primary outcome measure is not available. Table 1 outlines summary for all primary and secondary outcomes taken at baseline.

The mean age of participants was 36 years, and this included 45 females (75%) and 15 males (25%). It was noted that 66% ($n = 40$) of participants had no prior contact with mental health services and 45% ($n = 27$) stated they were reluctant to access face-to-face support. It was also noted that over three quarters of participants 78% ($n = 47$) were currently taking medication for depression. Finally, almost a third or participants 30% ($n = 18$) stated that they chose an online service as waiting times for access to face-to-face psychological therapies were too long.

Interview data was gathered from participants ($n = 5$) across both VC groups. The findings here appear largely positive regarding the acceptability of the intervention. For example, one group member noted, "it's been really good for me, and it's brought me a little bit closer to other people" and "just being able to open up to somebody, [they] gave me some

Gender	
Male [*n* (%)]	15 (25%)
Female [*n* (%)]	45 (75%)
Age (years) [range, (mean)]	18–59 (36)
Number registered to take part	60
Randomised to intervention arm	24
Took part in online group [*n* (%)]	8 (13%)
Taking medication for depression [*n* (%)]	47 (78%)
Had not used any type of mental health service previously [*n* (%)]	40 (66%)
Depression level – PHQ-9 [mean (SD)]	18.1 (5.9) = moderately severe major depression
Reasons for wanting online service.	
Reluctant to use face-to-face service [*n* (%)]	27 (45%)
Waiting times too long for other service [*n* (%)]	18 (30%)
No local services [*n* (%)]	5 (8%)
Other [*n* (%)]	10 (17%)

Source: Created by authors

great advice [. . .] it's actually got me out of an abusive relationship" *[VC group member 5]*. Being able to join an online group from the comfort of one's home was also an important benefit for participants. Increased comfort through a familiar setting appeared to reduce anxiety e.g. "I mainly wanted online because I don't do very good in public, in groups [. . .] online I could do it from the comfort of my own home" *[VC group member 2]*. Interviews with group facilitators (*n* = 3) also noted that:

> There may be people who may feel more comfortable with the teleconferencing [. . .] the fact that they're in their own home, rather than having the anxiety and [. . .] sometimes the discomfort that you can find when you have to take yourself out of that safe space and you have to go into another space [Service provider 2]

The importance of the facilitator also emerged as a key factor – "I think, (facilitator) is great [. . .] She actually comes in and she says, well, I can relate, and this is what happened to me". I think she's amazing" *[VC group member 1]*. The combination of group-based therapeutic approaches and relatable facilitation appeared to produce positive outcomes. Communicating online was also felt to be easier with one participant noting that:

> I think my part in the group was more conversational than it might be in a face-to-face group, where I probably would have said far less, largely because the face-to-face groups tend to be bigger [VC group member 3].

Another participant stated, "I felt like I could open up a lot more than I would do in a room full of people. It felt a lot more comfortable for me" *[VC group member 4]*.

Observational data suggests organisational capacity needs to be further developed to implement the VC intervention successfully and seamlessly within a community setting. This may include additional training for staff in the uses of VC technology or having dedicated technical support when VC groups are being delivered. These observations were also supported by qualitative data where one of the group facilitators noted,

> [. . .] people [need] to be confident about how to get over problems when they arise [. . .].we experienced [problems] in the laboratory [. . .]. but when going live, having IT support present when the groups were running, especially for a number of weeks, [. . .] is something that is needed going forward (Service Provider 3).

These early "teething issues" caused a delay between initial recruitment and intervention delivery, and this may have partially accounted for poor retention figures given the some of the symptoms of depression (reduction in motivation and energy). Scheduling a short induction session within the 24 h following registration appeared to improve somewhat.

The online survey was viewed as an appropriate recruitment method at baseline with no missing data and recruitment targets were reached within two weeks. This recruitment strategy also appeared to attract individuals with higher levels of depression – two-thirds (66%) of whom had not accessed face-to-face services before. This data appears to support subsequent research that arose from the pandemic that VC-based support services may be beneficial for targeting hard-to-reach populations (Keen *et al.*, 2022).

Discussion

This research was carried out before the worldwide pandemic took place; however, it would be prudent to reflect on the findings in line with post-pandemic research considerations as well as contemplating pitfalls that may arise when considering such an intervention. Research has demonstrated that VC and other technological based interventions help mitigate key barriers to accessing treatment, yet these findings failed to materialise in this research as low uptake to the treatment was observed. This low uptake and lack of feedback contrasted with the initial "surge" in recruitment (targets met in a relatively short time) and a suggested desire to engage by completing a battery of questionnaires. Approximately, 10% ($n = 6$) even went as far as having online induction sessions but failed to follow through with action in terms of joining the online support groups. Although we know from qualitative data that the use of online VC technology may present significant barriers, this does not fully explain the apparent *intention-behaviour gap* displayed by those who signed up to the service but did not follow through with attending a group. This phenomenon is not uncommon. Other research has also reported programme failure for interventions that appeared to be "no brainers", (Ryan *et al.*, 2017; Achilles *et al.*, 2020) and propose that theory-based approaches help uncover limitations in both design and implementation (Davis *et al.* (2015).

Reflecting on the data we gathered for this study, it is clear participants *intended* to join an online group, suggesting that this population may require help with planning and acting post registration. While the research team did devise approaches to address this issue within the study, such as running induction sessions to increase familiarity, agree times of meetings and establish an early rapport with participants, low attendance and uptake was still evident. As such, even with the best intentions and plans in place, situational barriers (confidence using the technology, ease of signing up to the service combined with disinhibition around committing to following through with intended actions as no initial face-to-face contact) may still prevent the desired behaviour from occurring. With recent technological developments, it is a lot easier to engage with online interventions, the upsurge in the use of Zoom, for example (Branscombe, 2020), suggest that it is not the lack of technology or awareness of these technologies that prevents engagement but perhaps inherent reluctance in the individual themselves or their clinical diagnosis.

In the past, behavioural *intentions* have been viewed as a key determinant of an individual's behavior (Alhamad and Donyai, 2021; Weinstein, 2010). As such, intentions are viewed as a clear decision to behave in a particular way, with a focus on motivation(s) to reach a goal; thus, the Theory of Planned Behavior (Ajzen, 1985). However, emerging research has found that intentions are not a robust predictor of behavior and there is often a

discrepancy between what people *say* they will do and what they *actually* do (Faries, 2016; Conner and Norman, 2022). In the health psychology literature, this is referred to as the intention-behaviour gap and reflects the unseen, but powerful underlying psychological processes that determine whether intentions are translated into actions.

Kramer *et al.* (2014) put forward a strong argument for applying theories from the Health Action Process Approach (HAPA) to understand this phenomenon, as it combines hypotheses from different motivational (forming intentions) and volitional (planning and taking action) theories (MacPhail *et al.*, 2014). This model also highlights the importance of perceived self-efficacy throughout all stages of health behaviour change (Sutton, 2010). However, the HAPA model follows a linear pattern from intention to post-intentional processes to predict the likelihood of successful change. Depressed individuals have great variability in mood (Yitzhak *et al.*, 2023) making it less likely that a linear model of change will predict positive action following intentions (Hayes and Andrews, 2020). A long-established theory that recognizes the unpredictability of dynamic systems, known as "Chaos Theory", may help shed further light on the challenges of using a linear health behaviour model.

Chaos theory was developed in the early 70s by an American mathematician called Lorenz (Oestreicher, 2007) to help explain unexpected outcomes with no apparent cause-effect relationship. Chaos theory is now also known as complex systems theory or dynamic systems theory and as such it is no surprise that this theory has been applied to mental health research (Fried and Robinaugh, 2020) due to the complexity of the human brain and its impact on behaviour. This theory appreciates the nonlinearity of dynamic systems often distinguished as unstable, unpredictable and undergoing continual change. Therefore, chaos theory further helps account for unpredictability of outcomes in relation to treatment for depression, especially in relation to treatment delivered via a different modality which can also be unpredictable (i.e. technology).

As proposed by chaos theory, chaotic systems like the weather or human behaviour, can be viewed as countless states of energy, sometimes involving high, sometimes low energy. Visualized on a graph, they would have high points, peaks, low points and valleys dispersed between the peaks. Whatever the system, there is a tendency to be drawn to the valleys, which are coined as "attractors". Human behaviour is made up of a pattern of such attractors, in that we tend to react to our ever-changing environments in such a way as to expend the least energy possible, perhaps even more so for depressed individuals. Studies on behavioural activation support this hypothesis that individuals with depression engage in avoidant or withdrawal types of behaviours (mood dependent) that reduces contact with reinforcing activities thus extending the depressive cycle (Malik *et al.*, 2021).

This may help further explain the intention-behaviour gap we observed in the data. It may not take too much energy to sign up for an online support group in the moment, but that does not predict the depressed individual's subsequent mood which may prevent them from following through with their intended action. Combined with the actions required to complete that intention may also be perceived as too burdensome when faced with follow-up actions that are required for successful online engagement. Qualitative data highlighting both service provider and service user's fears around the use of technology further supports the HAPA model's key emphasis on a sense of self-efficacy when predicting health behaviour change. Quantitative data also suggested a generational issue as the average age of participants was 36 and a high proportion were in their 40s and late 50s. Therefore, it is also important not to make premature assumptions in relation to who will want a service, and even more important to do

preliminary work to identify the appropriate sample for studies of online services. In a post-pandemic environment however, would these findings still hold? The world had to adapt, and older generations, who may have avoided the use of VC, embraced developments. Reflecting on this learning, researchers should ensure that enrolling for online services contain as little registration steps as possible to increase adherence. The individuals must be motivated to engage. Telehealth is now more acceptable as a health system with virtual GP and consultant appointments becoming more normalised (RCGP, 2021). However, as stated by Eysenbach *et al.* (2004) in their paper on challenges to demonstrating effectiveness of technological interventions, there are dangers around recruiting "off the street" as those who seek and engage with online self-help groups may be a specific sub-group. The same could also be applied to the post-pandemic society, just because it became necessary during an unprecendented time in history will it necessarily equate to an acceptance of continuation of these services in the new "normal"?

Based on the above there are several considerations that future researchers should give thought to when using technology-based interventions with clinical populations, especially depressive conditions. While results did suggest a high level of acceptability among participants, the issues with recruitment and retention demonstrated that, as delivered, the intervention was not feasible. This research was carried out in a pre-pandemic environment when the use of VC and telehealth was in its infancy. Yet, it would not be unreasonable to embrace the findings for future research. There has never been a period in history where more people had access to VC apps on their mobile devices (Wang and Roubidoux, 2020) and it seems logical that barriers to technology access as well as the situational barrier of self-efficacy in technology usage has been somewhat overcome. Nonetheless, as noted by Conroy *et al.* (2020) technology-based interventions are only effective if the person has this access to them, knows how to use them and wants to use them, all of which can be dependent on a number of specific factors such as internet bandwidth, comfort levels for technology use as well as the clinical condition/s that they may have. Awareness of technical challenges and the digital divide with the population under review prior to intervention could help mitigate the limitations identified in this study. Participants in this study fulfilled the diagnostic criterion for a depression diagnosis and given that depression impacts upon a person's capacity to conduct their regular activities and can be distressing and disabling (National Collaborating Centre for Mental Health (UK), 2010), there is a clear potential capacity issue in terms of access to the technology. Simply, just because the technology exists does not necessarily correlate with a mode of service delivery that will result in acceptability and feasibility of an online intervention. Considerations must be given to the clinical profiles of the target population. While every effort was made to control for difficulties associated with depression, some factors may have been overlooked (patient self-reporting may not be a true reflection of motivation to engage) which may have contributed to the commitment to the study. Developers must look at the condition holistically and understand the potential barriers (outside of technological barriers) that could prevent engagement and therefore plan for mitigation. The lack of perceived personal interaction via VC delivery should be considered. Individuals may not see these supports as providing the connection that they may get from face-to-face interventions resulting in disengagement. Being explicit in what support will be provided, how this support will be provided and how often could be crucial to improve retention rates. These reflections could aid healthcare services to capitalize on population wide improvements in digital communication skills to address gaps in service provision and long waiting times. However, what remains true both pre and post pandemic is that theorising challenges ahead of the design and implementation phase may be as vital as theorizing what *will* work in Appendix.

References

Achilles, M.R., Anderson, M., Li, S.H., Subotic-Kerry, M., Parker, B. and O'Dea, B. (2020), "Adherence to e-mental health among youth: considerations for intervention development and research design", *Digital Health*, Vol. 6, p. 205520762092606, doi: 10.1177/2055207620926064.

Ajzen, I. (1985), "From intentions to actions: a theory of planned behavior", In J. and Kuhi J. Beckmann (Eds), *Action-Control: From Cognition to Behavior*, Springer, Heidelberg, pp. 11-39.

Alhamad, H. and Donyai, P. (2021), "The validity of the theory of planned behaviour for understanding people's beliefs and intentions toward reusing medicines", *Pharmacy*, Vol. 9 No. 1, p. 58, doi: 10.3390/pharmacy9010058.

Annaswamy, T.M., Verduzco-Gutierrez, M. and Frieden, L. (2020), "Telemedicine barriers and challenges for persons with disabilities: Covid-19 and beyond", *Disability and Health Journal*, Vol. 13 No. 4, p. 100973, doi: 10.1016/j.dhjo.2020.100973.

Bell, M., Schein, R.M., Straatmann, J., Dicianno, B.E. and Schmeler, M.R. (2020), "Functional mobility outcomes in telehealth and in-Person assessments for wheeled mobility devices", *International Journal of Telerehabilitation*, Vol. 12 No. 2, pp. 27-34, doi: 10.5195/ijt.2020.6335.

Berryhill, M.B., Halli-Tierney, A., Culmer, N., Williams, N., Betancourt, A., King, M. and Ruggles, H. (2019), "Videoconferencing psychological therapy and anxiety: a systematic review", *Family Practice*, Vol. 36 No. 1, pp. 53-63, doi: 10.1093/fampra/cmy072.

Bond, R.R., Mulvenna, M.D., Potts, C., O'Neill, S., Ennis, E. and Torous, J. (2023), "Digital transformation of mental health services", *Npj Mental Health Research*, Vol. 2 No. 1, pp. 1-9, doi: 10.1038/s44184-023-00033-y.

Bowen, R., Peters, E., Marwaha, S., Baetz, M. and Balbuena, L. (2017), "Moods in clinical depression are more unstable than severe normal sadness", *Frontiers in Psychiatry*, Vol. 8, doi: 10.3389/fpsyt.2017.00056.

Branscombe, M. (2020), "The network impact of the global COVID-19 pandemic", [online] The New Stack, available at: https://thenewstack.io/the-network-impact-of-the-global-covid-19-pandemic/

Braun, V. and Clarke, V. (2006), "Using thematic analysis in psychology", *Qualitative Research in Psychology*, Vol. 3 No. 2, pp. 77-101, doi: 10.1191/1478088706qp063oa.

Butzner, M. and Cuffee, Y. (2021), "Telehealth interventions and outcomes across rural communities in the United States: narrative review", *Journal of Medical Internet Research*, Vol. 23 No. 8, p. e29575, doi: 10.2196/29575.

Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J. and Zheng, J. (2020), "The psychological impact of the COVID-19 epidemic on college students in China", *Psychiatry Research*, Vol. 287 No. 112934, doi: 10.1016/j.psychres.2020.112934.

Conner, M. and Norman, P. (2022), "Understanding the intention-behavior gap: the role of intention strength", *Frontiers in Psychology*, Vol. 13, doi: 10.3389/fpsyg.2022.923464.

Conroy, K.M., Krishnan, S., Mittelstaedt, S. and Patel, S.S. (2020), "Technological advancements to address elderly loneliness: practical considerations and community resilience implications for COVID-19 pandemic", *Working with Older People*, doi: 10.1108/wwop-07-2020-0036.

Courtet, P., Olié, E., Debien, C. and Vaiva, G. (2020), "Keep socially (but not physically) connected and carry on", *The Journal of Clinical Psychiatry*, Vol. 81 No. 3, doi: 10.4088/jcp.20com13370.

Craig, P., Dieppe, P., Macintyre, S., Michie, S., Nazareth, I. and Petticrew, M. (2008), "Developing and evaluating complex interventions: the new medical research council guidance", *BMJ*, Vol. 337, p. a1655, doi: 10.1136/bmj.a1655.

Davis, R., Campbell, R., Hildon, Z., Hobbs, L. and Michie, S. (2015), "Theories of behaviour and behaviour change across the social and behavioural sciences: a scoping review", *Health Psychology Review*, Vol. 9 No. 3, pp. 323-344, doi: 10.1080/17437199.2014.941722.

De', R., Pandey, N. and Pal, A. (2020), "Impact of digital surge during Covid-19 pandemic: a viewpoint on research and practice", *International Journal of Information Management*, Vol. 55, p. 102171, doi: 10.1016/j.ijinfomgt.2020.102171.

Department of Health (2021), "III contents. [online",], available at: www.health-ni.gov.uk/sites/default/files/publications/health/doh-mhs-strategy-2021-2031.pdf

Eysenbach, G., Powell, J., Englesakis, M., Rizo, C. and Stern, A. (2004), "Health related virtual communities and electronic support groups: systematic review of the effects of online peer to peer interactions", *BMJ*, Vol. 328 No. 7449, p. 1166. available at: www.ncbi.nlm.nih.gov/pmc/articles/PMC411092/

Faries, M.D. (2016), "Why We don't 'just do it'", *American Journal of Lifestyle Medicine*, Vol. 10 No. 5, pp. 322-329, doi: 10.1177/1559827616638017.

Flodgren, G., Rachas, A., Farmer, A.J., Inzitari, M. and Shepperd, S. (2015), "Interactive telemedicine: effects on professional practice and health care outcomes", *Cochrane Database of Systematic Reviews*, Vol. 9, doi: 10.1002/14651858.cd002098.pub2.

Fried, E.I. and Robinaugh, D.J. (2020), "Systems all the way down: embracing complexity in mental health research", *BMC Medicine*, Vol. 18 No. 1, pp. 1-4, doi: 10.1186/s12916-020-01668-w.

Gentili, A., Failla, G., Melnyk, A., Puleo, V., Tanna, G.L.D., Ricciardi, W. and Cascini, F. (2022), "The cost-effectiveness of digital health interventions: a systematic review of the literature", *Frontiers in Public Health*, Vol. 10, p. 787135, doi: 10.3389/fpubh.2022.787135.

GOV.UK (2022), "A plan for digital health and social care. [online]", available at: www.gov.uk/government/publications/a-plan-for-digital-health-and-social-care

Grahek, I., Shenhav, A., Musslick, S., Krebs, R.M. and Koster, E.H.W. (2019), "Motivation and cognitive control in depression", *Neuroscience and Biobehavioral Reviews*, Vol. 102, pp. 371-381, doi: 10.1016/j.neubiorev.2019.04.011.

Greenhalgh, T., Wherton, J., Papoutsi, C., Lynch, J., Hughes, G., A'Court, C., Hinder, S., Fahy, N., Procter, R. and Shaw, S. (2017), "Beyond adoption: a new framework for theorizing and evaluating nonadoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies", *Journal of Medical Internet Research* [online], Vol. 19 No. 11, p. e367, doi: 10.2196/jmir.8775.

Griffiths, K.M. (2017), "Mental health Internet support groups: just a lot of talk or a valuable intervention?", *World Psychiatry*, Vol. 16 No. 3, pp. 247-248, doi: 10.1002/wps.20444.

Hayes, A.M. and Andrews, L.A. (2020), "A complex systems approach to the study of change in psychotherapy", *BMC Medicine*, Vol. 18 No. 1, doi: 10.1186/s12916-020-01662-2.

Hermes, E.D., Lyon, A.R., Schueller, S.M. and Glass, J.E. (2019), "Measuring the implementation of behavioral intervention technologies: recharacterization of established outcomes", *Journal of Medical Internet Research*, Vol. 21 No. 1, p. e11752, doi: 10.2196/11752.

Keen, S., Lomeli-Rodriguez, M. and Joffe, H. (2022), "From challenge to opportunity: virtual qualitative research during COVID-19 and Beyond", *International Journal of Qualitative Methods*, Vol. 21, p. 160940692211050, doi: 10.1177/16094069221105075.

Kobori, O. and Yoshinaga, N. (2020), "Investigation of the effects of an online support group for mental health problems on stigma and Help-Seeking among Japanese adults: a Cross-Sectional study (preprint)", *JMIR Formative Research*, Vol. 5 No. 9, p. e21348, doi: 10.2196/21348.

Kramer, A.D.I., Guillory, J.E. and Hancock, J.T. (2014), "Experimental evidence of massivescale emotional contagion through social networks", *Proceedings of the National Academy of Sciences* [online], Vol. 111 No. 24, pp. 8788-8790, doi: 10.1073/pnas.1320040111.

Krämer, L.V., Helmes, A.W. and Bengel, J. (2014), "Understanding activity limitations in depression", *European Psychologist*, Vol. 19 No. 4, pp. 278-288, doi: 10.1027/1016-9040/a000205.

Kroenke, K., Spitzer, R.L. and Williams, J.B.W. (2001), "The PHQ-9: validity of a brief depression severity measure", *Journal of General Internal Medicine*, Vol. 16 No. 9, pp. 606-613, doi: 10.1046/j.1525-1497.2001.016009606.x.

Le, L.K.-D., Esturas, A.C., Mihalopoulos, C., Chiotelis, O., Bucholc, J., Chatterton, M.L. and Engel, L. (2021), "Cost-effectiveness evidence of mental health prevention and promotion interventions: a systematic review of economic evaluations", *PLOS Medicine* [online], Vol. 18 No. 5, p. e1003606, doi: 10.1371/journal.pmed.1003606.

Mcdaid, D. and Park, A.-L. (2022), "The economic case for investing in the prevention of mental health conditions in the UK", [online], available at: mentalhealth.org.uk/sites/default/files/2022-06/MHF-Investing-in-Prevention-Full-Report.pdf

MacPhail, M., Mullan, B., Sharpe, L., MacCann, C. and Todd, J. (2014), "Using the health action process approach to predict and improve health outcomes in individuals with type 2 diabetes mellitus", *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, Vol. 7, pp. 469-479, doi: 10.2147/DMSO.S68428.

Maddux, J.E. and Meier, L.J. (1995), *Self-Efficacy and Depression. Self-Efficacy, Adaptation, and Adjustment*, pp. 143-169, doi: 10.1007/978-1-4419-6868-5_5.

Malik, K., Ibrahim, M., Bernstein, A., Venkatesh, R.K., Rai, T., Chorpita, B. and Patel, V. (2021), "Behavioral activation as an 'active ingredient' of interventions addressing depression and anxiety among young people: a systematic review and evidence synthesis", *BMC Psychology*, Vol. 9 No. 1, pp. 1-23, doi: 10.1186/s40359-021-00655-x.

Marsch, L., Lord, S. and Dallery, J. (2014), *Behavioral Healthcare and Technology: Using Science-Based Innovations to Transform Practice*, Oxford University Press, UK.

National Collaborating Centre for Mental Health (UK) (2010), *Depression: The Treatment and Management of Depression in Adults (Updated Edition)*, [online] PubMed. British Psychological Society, Leicester (UK), available at: https://pubmed.ncbi.nlm.nih.gov/22132433/

National Institute for Health and Care Excellence (2022), "Overview | depression in adults: treatment and management | guidance | NICE", [online] www.nice.org.uk, available at: www.nice.org.uk/guidance/ng222

NHS Digital (2019), "Mental health services monthly statistics – NHS digital", [online] *NHS Digital*, available at: https://digital.nhs.uk/data-and-information/publications/statistical/mentalhealth-services-monthly-statistics

Oestreicher, C. (2007), "A history of chaos theory", *Dialogues in Clinical Neuroscience*, Vol. 9 No. 3, pp. 279-289, doi: 10.31887/dcns.2007.9.3/coestreicher.

Office for National Statistics (2019), "Exploring the UK's digital Divide - Office for national statistics. [online]", Ons.gov.uk, available at: www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/articles/exploringtheuksdigitaldivide/2019-03-04

O'Kane, G. (2020), "Telehealth—improving access for rural, regional, and remote communities", *Australian Journal of Rural Health*, Vol. 28 No. 4, pp. 419-420, doi: 10.1111/ajr.12663.

Plackett, R., Blyth, A. and Schartau, P. (2023), "The impact of social media use interventions on mental Well-Being: systematic review", *Journal of Medical Internet Research*, Vol. 25 No. 1, p. e44922, doi: 10.2196/44922.

Rayland, A. and Andrews, J. (2023), "From social network to peer support network: opportunities to explore mechanisms of online peer support for mental health", *JMIR Mental Health*, Vol. 10, p. e41855, doi: 10.2196/41855.

RCGP (2021), "GP consultations post-COVID should be a combination of remote and face to face, depending on patient need, says college. [online,] www.rcgp.org.uk, available at: www.rcgp.org.uk/News/GP-consultations-post-COVID

Royal College of Psychiatrists (2021), "Pandemic impact on mental health backlog catastrophic, says Royal College of Psychiatrists", [online] *www.rcpsych.ac.uk*, available at: www.rcpsych.ac.uk/

news-and-features/latest-news/detail/2021/09/19/pandemicimpact-on-mental-health-backlog-catastrophic-says-royal-college-of-psychiatrists

Ryan, C., Bergin, M. and Wells, J.S. (2017), "Theoretical perspectives of adherence to Web-Based interventions: a scoping review", *International Journal of Behavioral Medicine*, Vol. 25 No. 1, pp. 17-29, doi: 10.1007/s12529-017-9678-8.

Sandberg, C.E.J., Knight, S.R., Qureshi, A.U. and Pathak, S. (2019), "Using telemedicine to diagnose surgical site infections in low- and Middle-Income countries: systematic review", *JMIR mHealth and uHealth*, Vol. 7 No. 8, p. e13309, doi: 10.2196/13309.

Scottish Government (2021), "Digital health and care strategy. [online]", available at: www.gov.scot/publications/scotlands-digital-health-care-strategy/

Senbekov, M., Saliev, T., Bukeyeva, Z., Almabayeva, A., Zhanaliyeva, M., Aitenova, N., Toishibekov, Y. and Fakhradiyev, I. (2020), "The recent progress and applications of digital technologies in healthcare: a review", *International Journal of Telemedicine and Applications*, Vol. 2020 No. 1, pp. 1-18, doi: 10.1155/2020/8830200.

Shaver, J. (2022), "The state of telehealth before and after the COVID-19 pandemic", *Primary Care: Clinics in Office Practice*, Vol. 49 No. 4, pp. 517-530, doi: 10.1016/j.pop.2022.04.002.

Slone, H., Gutierrez, A., Lutzky, C., Zhu, D., Hedriana, H., Barrera, J.F., Paige, S.R. and Bunnell, B.E. (2021), "Assessing the impact of COVID-19 on mental health providers in the southeastern United States", *Psychiatry Research*, Vol. 302, p. 114055, doi: 10.1016/j.psychres.2021.114055.

Snoswell, C.L., Taylor, M.L., Comans, T.A., Smith, A.C., Gray, L.C. and Caffery, L.J. (2020), "Determining if telehealth can reduce health system costs: scoping review", *Journal of Medical Internet Research*, Vol. 22 No. 10, p. e17298, doi: 10.2196/17298.

Social Care Institute for Excellence (SCIE) (n.d.), "Co-production", [online], available at: www.scie.org.uk/co-production/

Sutton, S. (2010), "Using social cognition models to develop health behaviour interventions the theory of planned behaviour as an example chapter outline. [online]", available at: www.phpc.cam.ac.uk/pcu/files/2012/01/sutton-2010.pdf (accessed, 21 October 2023).

Wang, S.S. and Roubidoux, M.A. (2020), "Coronavirus disease 2019 (COVID-19), videoconferencing, and gender", *Journal of the American College of Radiology*, [online], Vol. 17 No. 7, pp. 918-920, doi: 10.1016/j.jacr.2020.05.019.

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., McIntyre, R.S., Choo, F.N., Tran, B., Ho, R., Sharma, V.K. and Ho, C. (2020), "A longitudinal study on the mental health of general population during the COVID-19 epidemic in China", *Brain, Behavior, and Immunity*, Vol. 87, pp. 40-48, doi: 10.1016/j.bbi.2020.04.028.

Weinstein, N.D. (2010), *Exploring the Links between Risk Perceptions and Preventive Health Behavior*, Blackwell Publishing Ltd eBooks, UK.

WHO (2022), "Digital health not accessible by everyone equally, new study finds", [online] www.who.int, available at: www.who.int/europe/news/item/21-12-2022-digital-healthnot-accessible-by-everyone-equally-new-study-finds

www.gov.wales (2023), "Digital and data strategy for health and social care in Wales [HTML] | GOV.WALES. [online]", available at: www.gov.wales/digital-and-data-strategy-health-and-social-care-wales-html

Yitzhak, N., Shimony, O., Oved, N., Bonne, O. and Nahum, M. (2023), "Less inhibited and more depressed? The puzzling association between mood, inhibitory control, and depressive symptoms", *Comprehensive Psychiatry*, Vol. 124, p. 152386, doi: 10.1016/j.comppsych.2023.152386.

Further reading

Centre for Mental Health (n.d.), "Covid-19 and the nation's mental health: May 2021", [online], available at: www.centreformentalhealth.org.uk/publications/covid-19-andnations-mental-health-may-2021/ (accessed 31 March 2024).

Connected Nations Northern Ireland Report 2023 (2023), available at: www.ofcom.org.uk/__data/assets/pdf_file/0026/273725/connected-nations-2023-northern-ireland.pdf

Equity within digital health technology within the WHO European Region: a scoping review (2024), available at: https://iris.who.int/bitstream/handle/10665/365326/WHO-EURO-2022-6810-46576-67595-eng.pdf?sequence=1

Greenhalgh, T. and Russell, J. (2010), "Why do evaluations of eHealth programs fail? An alternative set of guiding principles", *PLoS Medicine*, Vol. 7 No. 11, p. e1000360, doi: 10.1371/journal.pmed.1000360.

IBM Corp (2017), "IBM SPSS statistics for windows", Armonk, New York, NY: IBM Corp, available at: https://hadoop.apache.org

Maddux, J.E. and Meier, L.J. (1995), *Self-Efficacy and Depression. Self-Efficacy, Adaptation, and Adjustment*, pp. 143-169, doi: 10.1007/978-1-4419-6868-5_5.

Mental Health Foundation (2023), "The most common diagnosed mental health problems: statistics", [online] www.mentalhealth.org.uk, available at: www.mentalhealth.org.uk/explore-mental-health/statistics/most-common-diagnosedmental-health-problems-statistics

National Institute for Health and Care Excellence (2003), *National Institute for Health and Care Excellence: Clinical Guidelines* [online] Nih.gov, available at: www.ncbi.nlm.nih.gov/books/NBK11822/

World Health Organization (2023), "Depressive disorder (depression)", [online] *World Health Organization*, available at: www.who.int/news-room/fact-sheets/detail/depression

Appendix

Item no.	Item	Where located** Primary paper (page or appendix no.)	Other† (details)
	BRIEF NAME		
1	Provide the name or a phrase that describes the intervention	3	Title reflects this
	WHY		
2	Describe any rationale, theory, or goal of the elements essential to the intervention	3, 6	ClinicalTrials.gov
	WHAT		
3	Materials: Describe any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers. Provide information on where the materials can be accessed (e.g. online appendix, URL)	N/A	ClinicalTrials.gov
4	Procedures: Describe each of the procedures, activities and/or processes used in the intervention, including any enabling or support activities	6–9	ClinicalTrials.gov
	WHO PROVIDED		
5	For each category of intervention provider (e.g. psychologist, nursing assistant), describe their expertise, background and any specific training given	6	ClinicalTrials.gov
	HOW		
6	Describe the modes of delivery (e.g. face-to-face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group	6–9	ClinicalTrials.gov
	WHERE		
7	Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features	6–7	
	WHEN and HOW MUCH		
8	Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule and their duration, intensity or dose	6–9	
	TAILORING		
9	If the intervention was planned to be personalised, titrated or adapted, then describe what, why, when and how	N/A	

(continued)

Table A1.
The TIDieR (template for intervention description and replication) checklist*

Item no.	Item	Where located ** Primary paper (page or appendix no.)	Other [†] (details)
10[‡]	*MODIFICATIONS* If the intervention was modified during the course of the study, describe the changes (what, why, when, and how)	11	
11	*HOW WELL* Planned: If intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them	10–15	
12[‡]	Actual: If intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned		

Note: Information to include when describing an intervention and the location of the information; [**]Authors – use N/A if an item is not applicable for the intervention being described. Reviewers – use '?' if information about the element is not reported/not sufficiently reported. [†]If the information is not provided in the primary paper, give details of where this information is available. This may include locations such as a published protocol or other published papers (provide citation details) or a website (provide the URL). [‡]If completing the TIDieR checklist for a protocol, these items are not relevant to the protocol and cannot be described until the study is complete
Source: Adapted from TIDierR Checklist: BMJ Open 2024

Table A1.

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