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ORIGINAL ARTICLE

Delivering group support for people with aphasia in a virtual world: experiences of service providers

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ABSTRACT

Purpose: This study explored the acceptability to service providers of delivering a novel group support intervention for people with aphasia (PWA) in a virtual world.

Materials and methods: The service providers were six group coordinators and 10 volunteers. Fourteen of the service providers participated in a semi-structured qualitative interview and 15 took part in a consensus group discussion. Qualitative interviews were analysed using framework analysis. For consensus group discussions, nominal group rankings were analysed and semantically similar responses were identified.

Results: Service providers described the virtual world as a safe space in which to communicate, connect, and experiment. The key barriers were technical, particularly relating to sound and connectivity issues. Service providers suggested a range of improvements to the virtual world and intervention programme. They reported that PWA benefitted from accessing a support group in a virtual world, with opportunities to connect socially and to develop their communication skills.

Conclusions: Service providers found delivery of group support intervention in a virtual world to be acceptable. The use of a bespoke virtual world to deliver group support intervention may enhance the experience and increase its accessibility, enabling more PWA to benefit from this type of intervention.

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Aphasia; group support; intervention; service provider; telerehabilitation; virtual world

➤ IMPLICATIONS FOR REHABILITATION

- People with aphasia benefit from group support intervention but may find it difficult to access face-to-face groups.
- Delivery of group support intervention in a virtual world is acceptable to service providers, can enhance the experience and increase accessibility of groups.
- Technical challenges present potential barriers when delivering group support in a virtual world, relating particularly to sound and connectivity.
- Potential benefits of this model of delivery, as perceived by service providers, include opportunities to connect socially and to develop communication skills plus specific and strong levels of enjoyment of the virtual context.

Introduction

The impact of aphasia on quality of life is well established [1]. Detrimental effects include loss of social contacts [2,3], reduced social activity [4], and risks to mental health [5,6]. Community aphasia groups aim to mitigate these effects. They have been defined as meetings between two or more people with aphasia (PWA) who are living in the community and where at least two of the following are provided: communication therapy, conversation activities, social and/or psychological support, education about stroke and aphasia, and participation in accessible activities [7]. Such groups provide a forum for communication exchange and humour [8], for sharing experiences of living with aphasia [9] and for rebuilding a sense of self [9,10]. In line with these aims, evaluation studies have demonstrated a range of positive outcomes following aphasia group attendance, relating to communication, social participation, and quality of life [11–15]. The value of group interventions has also been underscored by service users. A recent narrative review identified 11 key qualitative studies that explored consumer perspectives on community aphasia groups [16]. The authors concluded that participation in community aphasia groups contributes to the psychological well-being of PWA and their caregivers. Identified benefits included: forming positive relationships with others, gaining an enhanced purpose in life, greater autonomy and self-acceptance. Perceived benefits have also been reported by people with severe aphasia and their partners, following group participation [17].

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Despite the growing evidence for the efficacy and acceptability of community aphasia groups, their availability is far from universal. For example, a survey of practitioners in Australia found that just 36% of aphasia services offered group interventions [18]. In a separate study, speech and language therapists (SLTs) reported a range of barriers to group provision, for example, relating to staffing and transport [7]. In the face of such barriers, practitioners may turn to alternative models of provision. Staffing constraints, for example, may be overcome through delegated delivery, in which groups are supported by volunteers and/or SLT students (e.g., [19,20]). Efficiencies, particularly with respect to transport, may also be achieved by the use of telerehabilitation. This involves the use of digital technology, such as video-conferencing software, to deliver services remotely.

Applications of telerehabilitation in aphasia have largely involved the delivery of one-to-one assessment or therapy (e.g., [21–23]). However, a small number of studies have also explored remote group intervention [24–27]. Pitt et al.'s 12-week programme, called TeleGAIN, was delivered by a SLT researcher to groups of four participants over Adobe Connect. It involved a range of topic-based communication activities, aiming to improve communication related quality of life. An initial pilot study demonstrated good feasibility [24]. This was followed by a mixed-methods, phase two trial investigating the effectiveness of TeleGAIN, which reported that the programme brought about significant improvements in quality of life and communication measures [26]. Walker et al. carried out a group intervention for six participants with mild aphasia using a Cisco WebEx videoconferencing platform [27]. Their 12-week programme aimed to improve language abilities and promote social connections and was delivered by an SLT. They carried out single pre- and post-therapy assessments and reported gains in language abilities and reduced social isolation.

We further explored the feasibility of delivering remote aphasia group intervention, using a prototype virtual reality platform called EVA Park [28]. EVA Park is a virtual world designed with and for PWA [29]. Users are represented by personalised avatars and interact in real time using speech or typed messages. Locations on the EVA Park virtual island include houses, a bar, a hair salon, a treehouse, a town square, a café, and green spaces. Users can interact with the environment in an everyday or fantastical fashion, for example, by ordering a drink in the café or diving into the lake and swimming on a turtle. Previous research has demonstrated that PWA engage in a range of conversation activities in EVA Park [30] and express positive views about the platform [31]. In terms of outcomes, therapies delivered in EVA Park have achieved significant gains in everyday communication [32], word retrieval [33], and narrative production [34]. Here, we explored whether EVA Park could host community aphasia groups.

The group intervention delivered in this study aimed to promote wellbeing and communicative success, using a programme of 14 topic-based sessions delivered over six months. The feasibility study involved a mixed-methods, waitlist-controlled trial, in which 34 PWA were randomised to receive intervention immediately or after a delay (31 began intervention). Feasibility findings, as assessed by recruitment and retention rates, compliance with intervention and measures of treatment fidelity, were positive [28]. Collection of outcome data was also feasible, using measures of wellbeing, communication, social connectedness, and quality of life; but there were no significant gains on these measures [28].

In line with the Medical Research Council guidance on the development of complex interventions [35], the feasibility study explored the acceptability of the EVA Park groups, from the perspective of both service users and providers. This paper reports the views of providers only. Acceptability is a complex construct. The framework proposed by Sekhon et al. [36] incorporates seven components: Affective attitude (how an individual feels about the intervention); Burden (the effort required by the intervention); Ethicality (the extent to which the intervention fits with the individual's value system); Intervention coherence (reflecting the individual's understanding of the intervention); Opportunity costs (reflecting what must be given up to engage in the intervention); Perceived effectiveness (the extent to which the intervention is thought to achieve its purpose) and Self efficacy (the participant's confidence in their ability to engage with the intervention). All components can be applied to those who receive or deliver a healthcare intervention. Acceptability of an intervention to service providers is crucial for uptake in practice [37]. Providers may identify barriers to the successful administration of therapy and signal the need for improvements. They may, additionally, cite contextual factors, for example, relating to their local area and client group, which necessitate adaptation to the therapy (see examples in [35]).

Surveys of SLTs have identified a number of barriers to the adoption of telerehabilitation, including low technological confidence amongst therapists, problems with internet connectivity, and cost restrictions; respondents were also concerned that telerehabilitation might threaten the therapeutic relationship with clients and replace face-to-face interactions [38,39]. More positive views have been reported from those who have actively delivered remote services, including improved access to services and savings in time and costs [39,40].

A number of studies have explored the experiences of staff, students, volunteers, and peer leaders who have delivered aphasia community groups (e.g., [17,19,20,40–42]). Just one study has investigated the views of clinicians delivering remote group intervention [25]. This employed semi-structured interviews conducted after each therapist ($N = 3$) had administered TeleGAIN with at least one cohort of participants. Four themes emerged from the data. The first concerned the experience of providing online group therapy. Drawing comparisons with face-to-face groups, respondents reported that it was possible to build a rapport with participants and facilitate communication online. Some noted developing skills in managing online group dynamics as the sessions progressed. The second theme addressed barriers and facilitators. The former mainly related to the technology, and included problems with internet connectivity, poor sound, and reduced video quality. These problems were reported to disrupt turn taking, the naturalness of conversation and the provision of communication support. Facilitators included the support of communication partners, the design of the TeleGAIN programme and the associated resources. The small group composition, with cohorts being restricted to four members, and the careful grouping of participants who shared interests was also cited. The third theme related to the perceived benefits of the intervention. A key benefit was the opportunity to make new connections with other stroke survivors from across Australia, particularly for participants living in remote areas. The online therapy platform was seen as a safe environment in which aphasia was understood and support available. The therapists also expressed the view that involvement with TeleGAIN improved participants' wider technological skills and might encourage take up of other opportunities such as Skype and email. The final theme concerned the feasibility of implementation. All respondents felt that TeleGAIN could augment current aphasia services and promote the wider availability

Table 1. Participant details – qualitative interviews.

ID	Group	Role	M/F	Previous experience	Years of experience with aphasia	Technological experience
C1	Saturn	Coordinator	F	SLT and stroke/aphasia group coordinator	7	None described
C2	Saturn	Coordinator	F	Stroke/aphasia group coordinator	7	Microsoft Office programmes, email, Skype, Facetime
C3	Mercury	Coordinator	F	Stroke/aphasia group coordinator	2	Computers for office work, iPads at home
C4	Jupiter	Coordinator	F	SLT and stroke/aphasia group coordinator	4	Supporting PWA to use technology
C5	Venus	Coordinator	M	Stroke/aphasia group coordinator	3	Teaching ICT in secondary school, setting up website, desktop publishing, social media
C6	Venus	Coordinator	M	Stroke/aphasia group coordinator	25+	Teleconferencing
V1*	Venus and Saturn	Volunteer	F	SLT	11	Using therapy apps, AAC and assistive tech with communication difficulties
V2	Saturn	Volunteer	F	SLT student	No data	Described self as "pretty rubbish with tech"
V3	Venus	Volunteer	M	SLT student	No data	Used tech for work, e.g., Skype
V4	Mercury	Volunteer	M	Volunteer at aphasia centre	4	Used computer for work, emailing, Facetime
V5	Mercury	Volunteer	F	Volunteer at aphasia centre	13	Uses iPads at home and aphasia centre, Skype
V6	Mercury	Volunteer	M	Volunteer at aphasia centre	2	Described self as "bit of a tech-geek, really into computers"
V7	Jupiter	Volunteer	M	Volunteer at aphasia centre	4	Described self as "very tech savvy"
V8	Jupiter	Volunteer	M	Volunteer at aphasia centre	No data	Used computer at work, Excel

V1* volunteered in two groups and was interviewed twice. Therefore, there were 14 participants who took part in a qualitative interview and 15 interviews. When reporting quotations for V1, it will be stated whether the comment referred to Venus or Saturn group.

of group therapy. The opportunity to assemble groups that were not constrained by geography was particularly valued. Barriers to wider uptake included negative perceptions of telerehabilitation amongst SLTs, cost restrictions, and limited access to technology.

The current EVA Park study employed a delegated model of delivery, in which groups were led by community-based coordinators and volunteers. Their experiences of delivering the intervention were investigated via semi-structured interviews and consensus discussions. Thus, this study adds to the findings of Pitt et al. [25] about the acceptability of online aphasia group delivery, but explores this from the perspective of community/volunteer providers in the context of a virtual reality environment. The views of users with aphasia and a subset of their family members will be reported in a separate paper.

The overarching question addressed by this paper is:

How acceptable did service providers find the EVA Park group intervention?

Sub-questions were:

a. What views did service providers express about the intervention and its delivery in the virtual platform of EVA Park?
b. What barriers and facilitators did they experience?
c. What changes or improvements would they suggest to the intervention or its delivery?
d. What were the perceived impacts for service providers and participants with aphasia?

These questions relate to all components of the Sekhon framework [36]. Acceptability findings will be summarised against that framework in section "Discussion".

Methods

Ethical approval was granted by the Ethics Committee of the School of Health Sciences, City, University of London. All participants gave informed written consent.

Participants

Six coordinators and 10 volunteers delivered the intervention. They were recruited to four groups (Jupiter, Saturn, Mercury, and Venus) in different geographical locations of the UK. (*Note.* In the paper reporting quantitative results about this project [28], the groups were described by their geographical location (North, South, East, and West). The group names have been anonymised here due to the more personal nature of the qualitative data).

The six group coordinators all had experience of leading face-to-face social support groups for PWA within the voluntary sector. They were supported by 10 volunteers, who had experience of supporting social groups for PWA or other aspects of aphasia intervention. Jupiter and Mercury's volunteers already had links to the coordinators' existing face-to-face groups, while Saturn and Venus recruited volunteers specifically for the study. Three volunteers had communication impairments following a stroke: V4 and V8 had aphasia, and V7 had dysarthria (Table 1). Co-ordinators and volunteers included individuals who were qualified or student SLTs.

Group members

Thirty-one PWA took part in the intervention (Table 2). Members were recruited through the aphasia groups run by the coordinators, other community groups and via self-referral. The recruitment criteria were mild or moderate aphasia (assessed using the Western Aphasia Battery-Revised (WAB-R) [43]), fluent in English before their stroke, no co-existing diagnosis affecting cognition and no severe visual or hearing impairments. Twenty-nine group members completed the study. One withdrew from Jupiter group after three sessions due to difficulties engaging with the remote group, while one withdrew from Saturn group after four sessions for family/health reasons.

Intervention

The group activities aimed to promote wellbeing, give participants experiences of communicative success and foster social connection. All groups followed a programme specified in a

Table 2. Characteristics of group members with aphasia.

Group	Number of members who started intervention	Number of members who completed intervention	Gender (number (%) female/male)	Mean WAB-R score (range)
Saturn	8	7	1 (12.5%)/7 (87.5%)[a]	80 (60–96)
Mercury	8	8	3 (37.5%)/5 (62.5%)	76 (58–93)
Jupiter	6	5	4 (66.7%), 2 (33.3%)[a]	67 (42–90)
Venus	9	9	7 (77.8%)/2 (22.2%)	74 (61–91)

[a]Two male participants withdrew from the study, one from Saturn and one from Jupiter group.

manual developed by the research team, which outlined the underlying principles, group treatment techniques and provided detailed session plans. There were 14 sessions delivered fortnightly. Sessions lasted 90 min and each focussed on a different topic. (See S1 Supporting Information: "List of Intervention Sessions and Sample Session Plans" [28]). The initial session introduced participants to the world of EVA Park. Several sessions explored personal themes, i.e., "you", aphasia, resilience, and personal strengths. Others related to the topical themes of music, comedy, sports, eating out, art, and literature. In addition, groups were encouraged to complete a project of their choosing. This involved group members creating something collectively (e.g., an aphasia awareness film, or an audio podcast about aphasia). They worked collaboratively towards their shared goal, drawing on individual skills. For example, the skills of a former video editor were harnessed when making a film about EVA Park. The final session was dedicated to reviewing the programme and having a party.

Group members accessed EVA Park using a computer in their own home. As well as attending the scheduled group sessions, they were encouraged to visit EVA Park between the sessions. Coordinators and volunteers accessed the virtual world from their home computers or from computers at their community centre.

Role of coordinators and volunteers

The group coordinator's role included identifying suitable group members with aphasia, setting up EVA Park on members' computers and training them to use it, leading the sessions, delegating roles to the volunteers and liaising with the researchers. In two groups (Saturn and Venus), this role was shared between two coordinators. Volunteers typically supported PWA with technical aspects of the project and with communication. Often members were split into two groups for discussions within sessions, with volunteers supporting the sub-groups.

The coordinators and volunteers received two training sessions before the intervention began, each lasting 3–4 h. An initial technical training session covered how to set up EVA Park, the basics of operating it and how to create an avatar. The second session introduced the group intervention programme, its theoretical background and the therapy manual. Coordinators and volunteers also received ongoing supervision and technical support from a team of researchers based at City, University of London.

Research methodology

Two methodologies were used to explore the research questions: individual qualitative interviews, and nominal group discussions which aimed to reach a consensus on the benefits of EVA Park and the ways it could be improved (research sub-questions c and d).

Semi-structured qualitative interviews

The six coordinators and 10 volunteers were each invited to take part in a semi-structured, in-depth interview. All six coordinators were interviewed. Amongst the group of 10 volunteers, one was unavailable, one was interviewed but a recording error meant that their interview could not be analysed, and one (V1) participated in two different groups and was therefore interviewed twice. Therefore, nine volunteer interviews are reported, from eight different respondents. This means that a total of 15 interviews were included in the analysis (Table 1).

Of the 15 interviews, 13 were conducted remotely using Skype, with participants either at home ($n = 12$) or at their community centre ($n = 1$). Two interviews were conducted face-to-face, one at a university and one at a community centre. Interviews took place within four weeks of the intervention finishing. They lasted on average 54 min (range 24–100 min) and were video-recorded. They were conducted by a researcher (AC) who had no previous involvement in the project. The interviewer was a SLT with extensive experience of communicating with PWA and dysarthria. She received formal training in qualitative interviewing techniques, analysis and reporting from NatCen Learning [44] and supervisory support throughout the study from a senior qualitative researcher (MC).

Questions focused on experiences of EVA Park and the group support intervention, the impact of taking part on group members and on themselves, and suggestions for improvements. The topic guide (Appendix 1) was developed by the researcher (AC) in consultation with the project managers (ND and RT). Data were transcribed verbatim by an independent transcription service. Accuracy was checked by comparing eight (53.3%) of the transcriptions with the video recordings. This was found to be very high, with only occasional spelling errors. In line with the recommendations of Morse [45], member checking was not conducted.

Analysis

Framework analysis [46] was conducted. An initial thematic framework was developed by the lead author (AC) after familiarisation with the data. The themes were primarily derived inductively from concepts that emerged from the interview data (e.g., relating to affect, confidence, and technical aspects). However, in common with "codebook thematic analysis" approaches [47], there was also a deductive element, with some themes closely related to the research questions and topic guide (e.g., impacts, improvements). The framework was refined using an iterative process and through discussion with the research team. The final thematic framework (Appendix 2) comprised 13 main themes, including three free nodes, under which 45 sub-themes were arranged. Main themes and sub-themes were defined (Appendix 3), which facilitated consistency within and between analysts.

The data were managed using NVivo v.12 (QSR International, Doncaster, Australia). Transcripts were indexed according to the final thematic framework, with each phrase or passage assigned to one or more themes or sub-themes. Two researchers (AC and MC) analysed the interviews, and three interviews were double-indexed by both researchers using the final thematic framework in order to ensure rigour in the process. The researchers met regularly to compare and discuss their indexing. During the meetings, they discussed the definitions to ensure these were being interpreted consistently, for example, that sub-theme 3.7 "Technical aspects" should include references to broadband connections. Indexing was compared to ensure both researchers were assigning data to the framework appropriately under main themes and sub-themes. Discrepancies were noted and discussed, and agreement reached by reviewing the data in the transcript.

The indexed raw data were summarised into thematic charts, which were created in Excel (Microsoft Excel, Redmond, WA). Participants were entered as rows in the chart, while themes and subthemes were entered as columns. The final stage of the analysis involved mapping the data onto categories which emerged from the data and addressed the research questions [46]. Patterns were sought, with possible explanations for these considered.

Consensus group discussions

Each of the four groups took part in a separate consensus group discussion. All six coordinators and 10 volunteers were invited to take part, but one coordinator (C1) and two volunteers were unable to attend (V3 and a volunteer who was also unavailable for a qualitative interview). Thirteen service providers (five coordinators, eight volunteers) took part. One participant attended twice as she volunteered in two groups. The Jupiter, Saturn, and Venus groups all had three participants, whereas the Mercury group had five.

The discussions took place after all individual interviews had been completed so that the group discussion would not influence individual responses. Discussions were either held at the group's premises (Mercury and Jupiter) or at a university (Saturn and Venus). Each group discussion lasted for two hours. The discussions were video recorded, but were not transcribed. In order to ensure methodological consistency across the groups, all discussions were led by AC.

Procedure

The nominal group technique discussions [48] followed the procedure and adaptations for people with communication impairments described in Wallace et al. [49]. The group was presented with three questions, which were developed following discussion amongst the authors of the study:

1. What were the benefits of EVA Park?
2. How could the group intervention in EVA Park be improved?
3. How could you improve the technical side of EVA Park?

At the beginning of the session, participants were presented with a sheet showing the three questions and a summary of the procedure. Participants had an opportunity to ask questions about the process. Questions were presented one at a time. After each question was presented, participants were given time to reflect and to write down their responses. Each participant was then asked to share their first response, with the facilitator inviting contributions from each member of the group in turn. This process continued until all responses had been shared. The participants were encouraged to discuss and elaborate on their contributions. The facilitator grouped together responses that were the same or similar and sought clarification if necessary. Finally, each participant ranked the three responses that they considered to be most important, allotting three points to the most important point, two points to the second-most important and one point to the third most-important. This process was repeated for each of the three questions.

Facilitation was provided to participants who had aphasia or dysarthria. The nominal questions were presented in both verbal and written form. Supported conversation techniques were used throughout the discussions, including the use of written key words, gesture, drawing, repetition, and allowing sufficient time for participants to understand questions and respond. If necessary, the facilitator supported participants to write down their responses to the nominal questions. In these instances, the participant and facilitator used a separate, quiet room to discuss and record these.

Quantitative analysis

The results of the nominal group rankings were analysed separately for each of the four groups. Participants' scores for each question were added together to create a ranked list of the most important points. A summary of each consensus group discussion, including the nominal group rankings, was sent to participants for review and comment.

Qualitative analysis

In order to aid synthesis of the data across the four groups, semantically similar responses were identified by AC and checked with MC. Where there were discrepancies, these were discussed and agreed.

Results

Semi-structured qualitative interviews

Analysis revealed eight categories relating to the acceptability of the EVA Park group intervention to service providers. These were: (1) providers' perceptions of EVA Park as a platform for group social support, (2) views about the intervention and (3) emotional responses to the intervention, (4) barriers and (5) facilitators experienced, (6) suggested improvements to the intervention or its delivery, (7) impact of taking part for providers and (8) providers' perceptions of impact for members with aphasia. Appendix 4 shows which themes and sub-themes were mapped onto each of the categories.

Providers' perceptions of EVA Park as a platform for group social support

Providers expressed strong opinions about EVA Park as a platform for group intervention. These were generally very positive, including accounts of their experiences of virtual reality in the world of EVA Park, the relationships that developed and the sense of belonging to a safe community.

Providers commented that EVA Park felt like a safe and warm environment in which to practise communication skills, a place where one could experiment, feel understood and where it did not matter if people made mistakes. Some described delivering intervention in EVA Park as a novel and at times surreal experience, with the fantastical and quirky environment influencing providers' and members' emotions and interactions. One volunteer commented that in certain ways the environment felt natural:

"*Obviously, it's not natural in terms of flying around and riding turtles… but the way that there are things that can throw up a conversation … distract you in a good way … that's quite natural*" (V3). They reported a sense of joy, liberation, and escapism, where members had fewer inhibitions and could do things that were beyond their real world physical capabilities post-stroke, such as dancing and running. As a result, providers perceived members to be less defined by their disabilities. However, in one group, providers felt that the fantastical elements were unnecessary, distracting, and superfluous. One volunteer felt that Skype would have been easier to use for running a group, to focus on better communication rather than "*the more frivolous fantasy aspects*" (V7).

Some providers highlighted advantages of virtual over face-to-face groups, reporting for instance that some members appeared to feel more comfortable and willing to take risks in EVA Park than in the real world: "*I think you sort of let your guard down a bit in EVA Park. You can say stupid things, but as you're not face-to-face, you're not embarrassed about it*" (V4). They highlighted the superior accessibility of EVA Park, which was easily reachable from home. However, some negative opinions were expressed about using EVA Park for the intervention, either because the idealised tropical environment was not to their taste, or due to not being able to see people and the consequent limitations in the use of total communication strategies.

Providers described feelings of unity and of all being in this together. They felt that EVA Park offered access to a community of like-minded people. They were surprised by how connected members were in the virtual world, and how they were able to portray their personalities and humour: "*I was surprised that people actually connected really quickly on there. They made friendships really quickly and were able to support each other and have a laugh and have really interesting conversations, even though they'd never seen each other*" (C1).

There was also a chorus of frustration voiced about the technical challenges of delivering groups virtually. These frustrations were universal, but varied in the degree that they impacted on the overall experience of the programme. One group felt that these problems consistently undermined the quality of the intervention, while others commented that groups could progress successfully despite them. Frustrations with technology and constant technical support phone calls were the abiding memories of two providers (one coordinator, one volunteer).

Providers reported very different levels of confidence amongst members. Some were described as taking to EVA Park "*like ducks to water*" (C2), particularly those with a technical or computer background. Others reported needing a lot of support to develop their skills but gradually became more confident and participated successfully in the project.

All providers expressed enthusiasm for continuing to use EVA Park in their work. This however, would be as an addition or complement, rather than as a replacement for face-to-face groups. Other potential uses for EVA Park were suggested, such as providing individual therapy, support groups, or meeting informally for a conversation and a coffee. The potential to roll it out to a wider audience and link people in different countries was also highlighted. Coordinators and volunteers suggested that it would be particularly advantageous for people who were isolated, who could not attend or did not like face-to-face groups, and for younger stroke survivors who may be more familiar with the technology.

Views about the intervention

Providers described a highly structured programme, which they found supportive and balanced, alternating between fun activities and serious topics. The more serious topics (e.g., stroke, aphasia, You) provoked a range of reactions. Volunteers perceived that some members did not like looking back and delving into their personal thoughts, but others were pleased to have an opportunity to discuss these issues. Providers' opinions differed about which sessions were successful and which were more challenging. Several topics were universally well received (e.g., art, music, the pizza role play, and sports day), and no topics were universally criticised. Successful topics were those that made good use of the virtual environment, provoked disagreement and debate and facilitated members to share something of themselves. For example, the topic of art centred on discussion of a set of artworks displayed on screens in EVA Park. It provoked lively debate, particularly about Tracey Emin's "My Bed", and one member also did a slideshow of her own paintings. In one group, members had asked to do more role play as they felt EVA Park lent itself particularly well to this. Some providers felt more time was needed for certain topics or that the order could be improved, but views of the programme were overwhelmingly positive.

Providers generally said that the length of the intervention felt about right, but reported that many of their members would have been happy to continue for longer. In terms of length of the sessions, one coordinator reported that they flew by: "*I think everybody would have quite happily stayed on for longer . there was amazement that [the session] had gone so quickly and disappointment that it was the end actually*" (C5).

Emotional responses to the intervention

The intervention provoked a range of strong emotions amongst providers. Positive emotions resonated strongly with frequent references to laughter, happiness, enjoyment, and fun. Volunteers described feeling excited before sessions and finding them stimulating. The environment was also described in very positive terms: perfect, great, safe, stimulating, and fun. There were frequent mentions of the constant sunshine: "*EVA was … always bright and … always comforting – it's the most wonderful big blanket hug of an environment because the sun is always shining*" (V1, Saturn). There was a sense of pleasure and excitement about exploring the environment:

> It was sunny and you could hear the birds singing, blue sky and so it felt warm as well, I felt really good going in there and I went in there quite a lot on my own before the session started to familiarise myself. I really enjoyed exploring and sort of gasping every time I saw something new. (C5)

A volunteer recounted that a member went in between sessions to meditate on a giant rubber duck in the EVA Park lake: "*She said it was just that lovely feeling of oneness and freedom and being able to do something that was so completely unusual but very calming*" (V1, Venus). After the project ended, one coordinator (C3) reported that members often talked fondly of the virtual world (e.g., "*Oh, the yellow duck*" with exclamation), as if they were sharing fond memories of a place where they had been on holiday. One volunteer conveyed a sense of the surreal:

> I remember the British Gas guy came and I was doing EVA Park. I was saying, "Okay, let's all go and meet in the cocktail bar," or "Let's fly over there," and the guy was like, "You must have the most interesting job in the world" And I said, "Do you know what? It really is." (V6)

Some volunteers reported that they were surprised by how positive they felt about the virtual world, compared to their expectations:

> Because I just don't do that whole computer game thing, I thought I was going to be in some kind of strange computer game and I was just going to find it really difficult. I mean, I did find [learning how to

> operate the avatar, etc.] a bit of a challenge … but I guess I didn't expect the positives of actually thinking, oh wow, I can fly, it's really cool. (V2)

Coordinators voiced feelings of frustration that they could not support people adequately, given the difficulty of using supported conversation strategies in EVA Park. One coordinator felt that the standard expected of providers was "*frightening*" (C6), as they were delivering a complex programme, drawing on multiple philosophical approaches, while also trying to cope with the technology and establish group identity. Jupiter group's coordinator reported feeling overwhelmed after the initial training, realising that the demands were more than they had expected, and wondering if they had taken on something that they could not deliver. This group was the least well resourced, having only two volunteers, one of whom was often unavailable. The coordinator had not realised that they would need to do home visits to set up the technology and had to do all of these herself as the volunteers did not drive. The group also had high technical and communication support needs, as most members lived alone and the group included a member with more severe aphasia, who struggled to communicate through speech.

Frustrations with technical difficulties were widespread, and providers were concerned about the impact on members. Some providers perceived members to show resilience and tolerance in the face of difficulties, and one commented that they had anticipated that the technical issues would put members off EVA Park, but that this had not occurred. There was, however, concern that technical problems might highlight members' sense of isolation, if difficulties accessing EVA Park meant that they missed a group or could not fully join in.

Providers perceived both emotional connection and tension amongst members. Most providers described strong and developing bonds between members as the group gelled. Indicators of developing connections were that people shared personal information, e.g., about their marriage or birthdays. Some members felt comfortable disclosing sensitive information, e.g., about medical conditions. Members asked after each other when they were absent, indicating that they missed their presence in the group. One coordinator commented that the novel way of working seemed to encourage a sense of camaraderie. However, in one group, tensions were reported between members, with a volunteer reporting that there was a split in the group between members who were "*young minded, more enthusiastic, noisier*" and others who were "*more conservative and staid*" (V7). He felt that the topics of the programme and environment of EVA Park highlighted differences in their outlook and attitudes.

Providers reported that emotions ran high at the end of the programme. One volunteer described how members kept checking it was last session and were not ready to leave or for the sessions to end:

> People really didn't want to leave the world. … there were many multiple goodbyes, it was a bit like something at the Oscars, something we couldn't quite get off stage because we all still wanted to be there. We wanted to be there as a group, and we wanted to meet each other again somehow. (V1, Saturn)

One coordinator described a strong sense of group connectedness and sadness that it would not be continuing.

> We were just one big group of people who knew each other and considered each other friends. It was really sad at the end when we all said goodbye to each other … we all valued each other and considered each other friends really. (C5)

Barriers experienced

Providers reported a number of challenges and barriers relating to session content. Some topics, such as comedy and literature, were more demanding in terms of verbal and reading comprehension, as they required members to listen to and discuss a comedy sketch or share information about books they have read. The project also presented particular challenges, for example, one group was unable to complete the project because a key person was absent. Small-group work also presented barriers, for example, the process of subdividing the group and moving to new locations in EVA Park was described as difficult to manage and time-consuming. One group had insufficient numbers (owing to absences) to subdivide.

Providers experienced a range of technical challenges relating to the software, hardware, internet connectivity, members' previous technological experience, and communication barriers related to the technology. Regarding software, sound problems were frequent, particularly when moving between different areas in EVA Park. They included the presence of background noise and interference, as well as delays in hearing things. Common navigational challenges included difficulties moving avatars around and finding members if they got lost or strayed from the group. Furthermore, it was difficult to know who was talking and challenging to adjust the viewpoint of one's avatar so that two people could jointly attend to something. Technical challenges also included logging members back in if they were ejected, and time lags when playing videos. One volunteer described how difficulties logging in meant that "it just never seemed to be a full team" (V8). Technical barriers were also attributed to hardware issues. Having a sufficiently powerful computer and strong internet connection were key and service providers found it was crucial to take time to visit members at home to ensure that they were set up properly. Some members needed additional equipment, such as a mouse, due to motor problems. A volunteer described the challenges of running a group while also dealing with technical issues: "*Trying to manage technical issues at the same time as run a small session was incredibly challenging. that means that you're splitting your focus quite a bit*" (V6).

The technology also posed communication barriers that exceeded those experienced by service providers in face-to-face interactions with PWA. Many struggled with the limited range of communication strategies they could use remotely. They found it challenging not to be able to see facial expression and gesture, not knowing if someone wanted to speak, and not being able to use pen and paper to draw or write down key words. One volunteer who had dysarthria described having "*a lot of my communication taken away*" (V7). Although providers could use the typing facility to write messages on the screen, these did not remain on the screen permanently and so it was not possible to refer back to them. These barriers also meant that communication problems took longer to resolve.

There were similar challenges relating to the lack of touch and not being physically present, with one coordinator describing:

> You can't shake hands … you can't put your arm around somebody's shoulders. I found that sort of getting in the way of how I wanted to go about things, so it might be fun to have your avatar, but … your avatar's a bloody nuisance when you want to be kind to someone. (C6)

Some members were described as being quieter and harder to draw out in EVA Park compared to face-to-face groups, perhaps disclosing less because they could not gauge other people's reactions.

The interaction between technological and communication barriers meant that technological challenges took longer to resolve. Volunteers found it difficult to explain technological problems and solutions to members, and reported that members struggled to describe the problems they were experiencing. TeamViewer remote control software was used to access members' computers, but some members were reportedly unable to use this as they needed to be able to read aloud a code. Providers also reported that it was hard to interpret silences because they did not know if these were caused by technical problems or communication difficulties.

Facilitators experienced

A range of facilitators was described, including the roles played by coordinators, volunteers, and members, topics that facilitated social connectedness and features of EVA Park that acted as enablers.

The coordinators' role was key to facilitating the intervention. They reported using a range of different actions and strategies to prepare for and facilitate participation in groups. Actions taken to facilitate more efficient technology use included coordinators visiting all members at home before the group started to set up the technology and ringing/writing emails to members in advance of sessions, for example, to remind them to log on. Strategies to facilitate the smooth running of sessions included coordinators meeting in the virtual world before sessions to prepare. They also appreciated having a programme set out with questions and discussion topics planned in advance, thus reducing their workload. The coordinators who visited all members at home before starting the intervention also described this action as facilitating social connection, as it enabled them to get to know members in their own environment.

Coordinators had a key role in regulating the group and volunteers described different levels of control from coordinators. For example, one volunteer described how their coordinator was concerned that members would not have adequate support if they became upset, due to the virtual nature of the group. They therefore intervened to stop serious topics getting too heavy and "*straying into dangerous territory*" (V7). Others allowed their group "*to go off-piste conversationally*" (V3). Coordinators played a major role in managing turns within the group. This included inviting contributions from more reticent members and ensuring that those who were more verbal did not dominate.

Providers described how volunteers made a significant contribution to facilitating intervention delivery. This typically involved supporting conversation, asking questions, checking people had understood, offering technical support, supporting smaller groups, and reminding people to use facilitative features of software, e.g., using the textbox to type a message. They also gave additional support outside sessions, for example, helping a participant learn to move their avatar or fly.

All groups reported that they allocated particular volunteers or a coordinator to a technical support role, for example, volunteers would ring members if they were ejected from the virtual world, to help bring them back in. Coordinators expressed great appreciation for volunteers who provided technical support: "*V6 has been absolutely brilliant in terms of helping out and supporting with technical issues. It's been a great support to know that I can go to him for help and assistance*" (C3). Occasionally a coordinator or volunteer visited a member at home to resolve an issue that it had not been possible to solve remotely. Providers described a system for escalating technical support needs. If the delegated technical support volunteer or coordinator was unable to resolve an issue, they would contact the research team, who were described as being "*always available*" (C3) and generally "*phenomenal*" (V6). The researchers would go into EVA Park and make suggestions. They also met coordinators and volunteers in the virtual world after the session if there were lots of glitches. Training and regular support from the research team were key and valued. Technical support from the researchers was described as ongoing, both planned and in response to groups encountering technical barriers.

Members themselves were described as key in intervention delivery, encouraging and supporting each other to contribute and communicate. For example, some members would notice if another person had been quiet and would ask their opinion.

> They felt that … it was safe. It was not like the real world, people gave you time and they were kind and it didn't matter if you had a problem with your speaking, because the other group members …and the group leader and volunteers would be there to help you out. (V1, Saturn)

Providers reflected that members shared their mutual understanding of the challenges and frustrations of aphasia, and their strategies for dealing with these, which helped friendships to develop. They also shared tips for managing in the real world. Some members who were more verbal acted as facilitators, by planting ideas and scaffolding conversations. Members' own skills were considered to substantially contribute in some instances, e.g., an artist uploaded some paintings into EVA Park during the art session.

Several topics and activities were described as promoting social connectedness. For example, in the music session, members presented a piece of music to the group. This removed the pressure of having to present themselves verbally, but helped people find out about each other. Benefits of spontaneous music and avatar dancing were also reported:

> We were playing music and dancing and it was light-hearted and jovial and there was such a great feeling in the group… they were so happy and that was a really good bonding experience to have in EVA Park. From that point onwards it … we felt more of a group somehow. (C3)

Providers described certain features of the EVA Park software as enablers, for example, people could use a button to indicate that they want to speak. Specific locations also appeared to be facilitators. For example, a volunteer noted one member's love for the treehouse where he felt relaxed and uninhibited, thus able to talk more easily than in real life. Providers commented that the environment stimulated conversation in a spontaneous way, for example, riding on a turtle in the lake led to members having a conversation about swimming when they were young. They contrasted this with face-to-face groups, where conversation sometimes dries up:

> In EVA Park there aren't ever any lulls. Because . someone gets lost and you have to talk to them about how to get out of the river, or a bird flies by and someone mentions that … it keeps conversations going in a way that sometimes in real life doesn't happen. (V3)

Others commented that EVA Park felt like a safe space because the environment was unfamiliar to everyone, thus acting as a leveller.

Providers hypothesised that members' confidence may have been facilitated by being represented by an avatar in a novel environment, meaning that they were less defined by their weaknesses and did not feel judged.

> Maybe if they've got a bit of an identity crisis… they're getting used to a new normal … it feels like a big thing to join a group cos they're almost resigning themselves to what's happened and they're not ready, maybe, to do that. There's a bit of distance. in that virtual reality world cos you've got that safeguard of the avatar, so maybe it feels a little bit

> easier to do rather than to actually step out and say, "Here I am. I've had a stroke". (C1)

Providers also commented on the absence of real world barriers that may prevent people going to face-to-face groups, including practical issues such as transport.

Suggested improvements to the intervention or its delivery

Some suggestions were voiced to improve the intervention. These included: adding more role play opportunities to practise everyday conversations such as ordering a drink; space for more open-ended, unstructured conversations, e.g., about the news; and more reflection opportunities, i.e., allowing more time for following up on previous sessions. Several suggestions related to the management of "difficult" topics, addressing the impact of stroke and aphasia. Improvements included giving more time to these and balancing topics by including one "dark" and one "light" topic per session. Finally, earlier introduction of the project and more sessions dedicated to it were advised.

Providers proposed numerous technical improvements, ranging from general pleas for the smoothing out of technical issues to very specific recommendations. The key area highlighted for improvement was sound. Others felt that the software needed simplifying and updating to make it more accessible to a "*minimally technical person*" (V7). Preparation could have been improved by having some practice sessions before the intervention started. Practical suggestions for making the technology more usable included using more obvious colours to indicate whether the microphone was on or off and having the microphone turned on by default. The text box for typing messages could be improved by being larger, more prominent and keeping the text on screen for longer. Ideally, providers wanted a way to make people's cameras follow the avatars more automatically, with camera angles adjusted to make sure everyone could see the same thing.

Technical additions were proposed to enhance total communication. For example, a video conferencing facility within EVA Park would have enabled members to use total communication strategies. Another suggested addition was a drawing box within the screen. One provider suggested that social connections could be facilitated if they could send messages to people from different groups.

Impact of taking part for providers

Providers reported that they developed their skills, knowledge, understanding, and values. However, the prevailing impact was their sense of enjoyment:

> I really did look forward to [the sessions] … I finished and I was on a real high … I felt a bit bad really, I felt, well I hope I hadn't got more out of it than anybody else 'cos that wasn't the idea. (C5)

Another enthused, "*Do you know, I just think it's been joyous*" (V1, Venus)

Coordinators developed skills in facilitating groups. Most coordinators were experienced but had learnt new skills from running a group in a virtual world. They reported that it improved their listening skills, and made them more aware of their own communication and the need to monitor members' understanding. They developed skills in communicating in a virtual world, particularly the ability to tolerate pauses. One coordinator described the impact as developing skills in "*facilitating rather than leading*" (C5). Some coordinators reported using their new skills in face-to-face work with PWA.

Some providers felt they had developed their knowledge of aphasia, and their understanding of people's different problems, experiences and resilience. Many commented positively about developing experience with new technology. One volunteer described themselves as being from a "*non-techy background*" (V1, Saturn) but the project had affirmed that they could do something technological and thrive on it. While most coordinators and volunteers reported a range of benefits, one coordinator, who was experienced at running groups, felt that their only learning was about the technical side and hence very specific to EVA Park.

Providers' perceptions of impact of taking part for members with aphasia

Providers perceived a variety of impacts for members, relating to relationships, social connectedness, identity, confidence, communication, skills, and mood.

Providers spoke very positively about the impact of developing relationships during the project, with one coordinator saying:

> I'm an evangelist, I'll shout it from the rooftops because I think it's such a brilliant thing. I just think it's fantastic, those people have come so far as a result of it and established those friendships between themselves and with us, as well. And that's something really, really special. (C5)

Providers described benefits of developing social connections: "*It gives them an opportunity to network and speak to others in a similar boat, so I think it's a phenomenally beneficial tool*" (V6). One member was described as having "*a sense of connectiveness* [in EVA Park] *that wasn't happening in other aspects of his life*" (V1, Saturn).

Service providers frequently commented on the intervention's positive impact on the process of experiencing life differently post-stroke and the benefits of being able to experiment in EVA Park:

> In the last session people said they found it really weird that they could do things in EVA Park physically that they couldn't do in real life. … seeing themselves moving freely … when they had physical disabilities, so I think that was liberating for people as well. I guess that's part of the potential of EVA Park . it allows people to see themselves differently and to explore alternative ways of being. …. I think there's something about experimenting with being different but . in a safe world and not an everyday world, so experimenting with new ways of interacting. All of a sudden you've got this wonderful avatar and you can be the avatar in there with butterfly wings and roller skates. You can be quirky, you can be fun, you can start to explore bits of your personality that you wouldn't perhaps want to reveal outside or hasn't even occurred to you to reveal outside. (V1, Saturn)

Another member was described as seeming more anchored after four or five weeks of the intervention. In the real world, he was very affected by how people saw him, and seemed to flourish when not seen, and the ensuing sense of anonymity. Providers felt that group support and sharing of experiences was important and made a difference, giving members a sense of recognition and relief. "*I think* [discussions] *gave them the courage to know they weren't on their own, that other people have similar experiences and face similar challenges*" (C5).

Most providers perceived increased member confidence: "*I think EVA gives confidence and that's what people were telling us, that they actually felt really, really confident in world*" (V1, Saturn). One coordinator felt that EVA Park was a stepping stone for people who were worried about meeting others or going out into the community. Providers felt that confidence came from the fact they signed up, were willing to give it a go, got to know new people, discussed serious topics with them, expressed their points of view, and from the sense of having achieved something. An exception was one coordinator who reported some "*progress* *moments*" (C4), but did not think any changes in confidence could be attributed to EVA Park.

Providers saw progression in members' willingness and ability to participate in the group, describing an opening up of communication, debate, disagreement, and agreement. One coordinator commented on how members would listen and consider other's points of view before reacting. They became more able to initiate and more confident about holding different perspectives to others. Some providers suggested that group members were experiencing real world communication gains. For example, one member had participated in a conference discussion, and another had delivered a group presentation. However, other providers found it difficult to gauge whether there were real world benefits and/or whether these could be attributed to EVA Park.

Finally, providers observed that members had also developed their computer skills, such as switching on their laptop, using a microphone or headset, and using a computer to talk to someone rather than a phone. Providers also noted that some members got over a fear of computers, as they realised things may go wrong, but something can be done about it. However, there were no reports of members engaging in more technological activities or using new technology outside of the project.

Consensus group discussions

Across the four groups, providers generated a total of 60 benefits for Question 1 (20 Venus group, 17 Jupiter group, 10 Mercury group, and 13 Saturn group), 21 of which were prioritised during the ranking process (allocated a score of 1, 2, or 3). For Question 2, 59 suggestions for improvement were generated (15 Venus group, 16 Jupiter group, 17 Mercury group, and 11 Saturn group), 27 of which were prioritised. For Question 3, 60 improvements to the technical side of EVA Park were proposed (20 Venus group, 14 Jupiter group, 21 Mercury group, and five Saturn group), 26 of which were prioritised. Participants' prioritised responses to the three questions are presented in Tables 3–5. The points score shows the relative weighting given to each comment across the group.

Question 1: what were the benefits of EVA Park?

Connecting with others (reducing social isolation), a safe space to share and experiment, ease of access, and opportunity for communication were the highest ranked benefits of EVA Park (Table 3). In addition to being a safe space, EVA Park was described as providing opportunities for different kinds of activity (e.g., diving), being fun, adaptable, unique, stimulating, and having a positive effect on mood. Other benefits such as feeling liberated and protected using an avatar and developing skills were noted, but not ranked highly.

Question 2: how could the group intervention be improved?

Improvements to the content of sessions were the highest ranked suggestions (Table 4), followed by changes to the order of sessions or topics. For example, one group suggested that lighter topics should be addressed earlier in the programme, while another group recommended that each session start with a heavier topic and then move onto a lighter one. Two groups recommended holding sessions weekly. Issues related to training, communication and emotional support and the technology were also noted, but less highly ranked.

Question 3: how could you improve the technical side of EVA Park?

Changes to the sound and microphone were the highest ranked proposed improvements (Table 5). All groups included at least one comment relating to sound issues. The next highest priority for improvement related to improving communication support for PWA, for example, one group recommended using an interactive white board for writing key words. Improvements relating to the avatars, the technology or interface, and assisting PWA with the technology were also proposed.

Discussion

This study explored the acceptability of the EVA Park group intervention to service providers. It investigated their views about the intervention, its delivery in the virtual platform of EVA Park, barriers and facilitators they experienced, how it could be improved, and their perceptions about the impact of taking part for themselves and members with aphasia. The study used two qualitative methods, qualitative interviews, and consensus group discussions. The discussion will explore similarities and differences in the findings from these two approaches. It will discuss the findings in relation to Sekhon et al.'s theoretical framework of acceptability and compare the results to those of other studies investigating remote delivery of group intervention.

One key message emerging from both the interview and consensus group discussion data was an irrepressible enthusiasm for the possibilities and pleasures of EVA Park as a location for group therapy. Benefits were reported to be numerous and varied. There were vivid descriptions of EVA Park as a joyful, quirky, and stimulating platform for therapy. It was a place where providers perceived that members felt supported and understood and could explore their new post-stroke identity. However, a countervailing theme was that the huge therapeutic potential and dreamy escapism of EVA Park frequently collided with the day-to-day reality of technical challenges. Providers outlined a range of facilitators and barriers they had experienced and suggested numerous possible improvements to both the EVA Park platform and the group intervention programme. In relation to the Sekhon et al. framework of acceptability [36], this suggests that the intervention was highly acceptable in terms of affective attitude. Service providers suggested improvements that would decrease the burden of delivering it and the opportunity costs.

Despite the similarities between the interview and consensus group discussion data, there were also some differences in the two types of data. The technical challenges emerged as a common factor in the consensus group discussions, with the suggestions for technical improvements indicating that the providers' experiences of barriers were closely aligned. However, the interview data yielded richer information and a more nuanced picture about the impact of these technical challenges on the overall experience of taking part. In particular, for one group (Jupiter), these barriers were the predominant memory of EVA Park, while other groups navigated through the technical challenges and frustrations, and their abiding memories were more positive.

The interview data did not reveal any clear reasons for why experiences diverged in this fashion, but rather suggested that there might be combination of contributing factors. These included participants' knowledge of virtual reality, the number of members in the group, and how well resourced the group was in terms of the number of coordinators and volunteers. It was possible that having a "technology champion" contributed to the success of the group, i.e., a coordinator or volunteer who felt

Table 3. Consensus group discussion Q1 – What are the benefits of EVA Park?

Jupiter	Points/18	Saturn	Points/18	Venus	Points/18	Mercury	Points/30
Communication/conversation It gave an opportunity for group discussion/conversation	7	*Virtual world/space* Safe space to try new things/experiment	7	*Community/social connections* To reduce social isolation	3	*Community/social connections* Community, group bonding	6
Accessing therapy People could use it from home	5	*Community/social connections* Being part of a community (reducing isolation, no judgement)	6	*Accessing therapy* A group you can get to – don't have to travel, widens access for people with physical disabilities	3	*Virtual world/space* Safe space to share feelings and ideas, all in same boat	6
Community/social connections The opportunity to connect/interact with others outside of their usual group/therapy settings	3	*Communication/conversation* Developing robust communication skills	3	*Virtual world/space* A safe place to discuss a range of issues and ideas/share ideas, experiences, and strategies	3	*Accessing therapy* Ease of meeting, in own home, not travelling	5
Avatar More comfortable to be in EVA compared to talking on phone, due to being able to see the avatars	1	*Accessing therapy* Ease of access to therapy	1	*Avatar* The avatar provided protection	2	*Avatar* Avatar – feeling liberated, more free to express opinions, enjoyment, euphoria!	3
Other Good to have the chance to try something new and be part of something bigger	1	*Developing or transferring skills* Transferring skills – EVA provides a bridge between therapy environment and the real world	1	*Communication/conversation* It offers a heightened focus on speech-related aspects of communication and it helps create an audience, which suits the story-tellers	2	*Developing or transferring skills* Developing skills, e.g., strategy sharing, role-plays, and technology	2
Other Gives people with specific fields of interest an opportunity to shine	1			*Virtual world/space* Opportunities for different kinds of activity and communication (e.g., art and diving), because it's an imaginary space	2	*Communication/conversation* Improved speech – good place to practice skills	2
				Virtual world/space A fun place to try out new skills and ideas	1	*Virtual world/space* Unique place, new, exciting, stimulating for conversation	2
				Other Good for team-building, helpers can communicate efficiently, as it's easier to meet before group	1	*Virtual world/space* Virtual world has positive effect on mood, e.g., relaxing and sunny in EVA Park when bad weather in real world	1
				Virtual world/space An adaptable space where clients and supporters can work at a variety of levels	1		

confident in addressing the technical barriers, even positively relishing these challenges. However, there was no indication in the data that there was one crucial factor which influenced service providers' experience of group provision. In terms of the Sekhon framework of acceptability [36], there were differences in providers' confidence in their ability to engage with the intervention (self-efficacy), with Jupiter's coordinator expressing doubts that preceded the intervention and that were borne out by the challenges the group experienced. The intervention was less ethically acceptable to this coordinator as she had felt unable to support all group members adequately and to include a member with more severe communication difficulties. This suggests that having one service provider with a high level of confidence in their ability to engage with the technical aspects of the intervention, can reduce the burden for other providers and impact their perceptions of the effectiveness of the intervention.

The consensus group discussion data examined the benefits and areas for improvement separately. This method of data collection and analysis was much less time-consuming than the interviews and produced three sets of findings relating to the three questions. These results did not shed light on how the different elements inter-related. However, they did point towards similarities and differences between the groups in terms of their focus and priorities, which may have influenced providers' experiences. For example, when asked about the key benefits of the intervention, all groups commented on the benefits of being part of a community, reducing isolation or social connection. However, one group (Jupiter) gave greater prominence to opportunities for group discussion and conversation, and less weighting on social aspects. The groups also differed in the value they placed on EVA Park as a safe space to experiment, try new things and share. These differences in focus may have emerged organically from the members' interests and needs. Alternatively, the groups may have started the programme with different priorities and expectations, which could have influenced the providers' perceptions of members' experiences. In terms of intervention coherence, this suggests that there were some slight differences in providers' interpretation of the intervention, but that they focussed on aspects that they perceived as particularly valuable or suited to the virtual world.

In many respects, the findings from the interviews and consensus group discussions chimed with previous research into remote provision of aphasia groups. In common with Pitt et al., remote delivery was acceptable to providers who felt that it was possible

Table 4. Consensus group discussion Q2 – how could the group intervention be improved?

Jupiter	Points/18	Saturn	Points/18	Venus	Points/18	Mercury	Points/30
Training More staff training about content of sessions (rather than just on technology)	3	*Order of sessions/topics* Doing project at very end of intervention, to improve continuity and reduce interruptions, then finish with party	7	*Other* Separate log-in time 15 min before group starts	7	*Content of sessions* More flexibility, less structure	8
Order of sessions/topics Order of sessions could be improved by starting with practising technical skills, then getting-to-know-you activities, then lighter topics, then heavier/more personal topics	3	*Other* Having access to the virtual world at the end of the project	5	*Number/frequency of sessions* Weekly rather than fortnightly meetings	4	*Content of sessions* Avoiding topics that are heavy, focus on lighter topics/fun side of EVA	5
Training Start with technical training, e.g., learning to fly/sit/move, troubleshooting	3	*Content of sessions* Project – needing more time to establish as a group and choose the project	2	*Training* A more thorough induction process for group leaders at the beginning	2	*Number/frequency of sessions* Sessions held weekly rather than fortnightly	4
Other Intervention manual could be more aphasia-friendly	3	*Other* A way to facilitate participants to meet up between sessions in the virtual world	2	*Number/frequency of sessions* More sessions, carried out weekly	2	*Communication support for PWA* Members being able to indicate when they don't want to contribute (hard to interpret silence)	3
Communication support for PWA Need more ways to support communication as difficult to rely on speech only	3	*Training* More training and time to add/personalise content	1	*Technical issues* Acknowledgement that volunteers/coordinators may need to go back to some participants in person	2	*Order of sessions/topics* Topics addressing personal/sensitive issues – would be better to have structure of heavy topic at beginning of session then moving on to lighter topic	3
Technical issues Running groups would have been easier if no technical problems	2	*Other* The boards didn't work so well when the material was less visual	1	*Technical issues* Fewer changes in location, as changes can be excluding	1	*Other* Smaller groups	3
Emotional support Need method of 1:1 follow-up of emotional issues that arise during group sessions	1					*Emotional support* Fully trained therapist present when discussing personal/sensitive issues	2
						Content of sessions More role plays	2

for members to build rapport online and develop positive group dynamics [25]. Both studies found that PWA were perceived to be able to adapt to online delivery with support and to develop their independence in using the technology over the course of the intervention. However, providers in the current study stressed that remote groups should augment, rather than replace face-to-face groups. They highlighted the different needs and preferences of PWA, some of whom may prefer remote groups or be unable to attend face-to-face groups, while others may struggle to access groups in a virtual world due to having more severe aphasia or technical challenges. In terms of acceptability, this suggests that service providers consider that the intervention may be more suited to some PWA than others, given the different burdens and opportunity costs they may experience.

There were some minor differences in the benefits reported in Pitt et al.'s TeleGAIN study [25] and the current study. In both studies, providers perceived that members benefited from getting to know new PWA, in a safe and supported environment, where their difficulties were understood, suggesting a high level of perceived effectiveness. Pitt et al. reported particular enthusiasm for meeting people living in other places, especially for those in remote locations. However, this was less apparent in the current study, as group members mostly came from similar geographical areas where they had access to a local aphasia group. Whereas the providers in Pitt et al.'s study reported that members improved their skills and confidence in using technology, this was less apparent following group intervention in EVA Park, perhaps because the technology used was bespoke, rather than mainstream, and therefore the skills gained were less transferable to other contexts.

Barriers experienced in EVA Park were also similar to those reported in Pitt et al. [25]. For example, technical challenges relating to sound and internet connectivity were reported, although the study used video-conferencing software rather than virtual reality. The interaction between technical and communication challenges was also an experience in common, for example, Pitt et al. described the challenges of providing communication support when sound quality was poor or providers could not see members' faces.

The technologies used in this study and by Pitt et al. differed, and this in turn led to some important differences in the findings. For many, although not all, of our service providers the virtual

Table 5. Consensus group discussion Q3 – how could you improve the technical side of EVA?

Jupiter	Points/18	Saturn	Points/18	Venus	Points/18	Mercury	Points/30
Tech general Technology could be more modern	7	*Sound/mic* Improve sound quality/reduce interference	6	*Communication support* A Skype-type help box, so that participants could show coordinators/ volunteers what the problem was	6	*Sound/mic* Clearer symbol for microphone	10
Communication support Technology could have been more aphasia-friendly	5	*Sound/mic* Making it clear that all participants must wear headphones	4	*Avatars* Avatars should be visibly able to speak	4	*Other* Clearer guidance re checking the spec needed for laptop and minimum broadband speed required	3
Avatars Avatars could have been simpler so that people with aphasia could set them up independently	3	*Sound/mic* Colours on microphone more obvious	4	*Sound/mic* Sound issues including better differentiation between colours for having sound on/off and a one-step, rather than two-step process, to turn mic on	3	*Tech assistance* More time setting members up with technical side, more technical support	3
Sound/mic Microphone button could be improved	1	*Communication support* More aphasia-friendly support to help facilitate PWA to trouble-shoot tech issues	2	*Avatars* A way that everyone could be clothed all the time	2	*Communication support* Interactive white board for writing key words	3
Tech general Interface needed to be tamper-proof	1	*Sound/mic* One-click button for sound	2	*Avatars* Process of selecting and changing avatar should be simplified	2	*Tech assistance* Better remote control so that volunteers can assist members remotely	3
Other Easier to make YouTube videos play simultaneously	1			*Tech assistance* Needed more emphasis on the importance of TeamViewer	1	*Tech assistance* A button to indicate "I need help"/"I'm stuck"	3
						Tech general Uniform and simpler interface	2
						Other Training video	2
						Other Better internal communication for volunteers	1

environment of EVA Park was not simply acceptable, but was seen to augment the therapy experience. For example, respondents described how it injected humour, surprises, and conversation topics into their sessions; and reflected on the opportunities for experimentation and confidence building given to their members. Such augmentations were not identified in Pitt et al., which used video conferencing. Conversely, being unable to see facial expression and body language in EVA Park was regretted by some respondents, while this was clearly possible in Pitt et al.'s TeleGAIN sessions. These observations point to the varying opportunities provided by different remote technologies. They suggest that service providers would benefit from a range of technological options being available, depending on the nature and sensitivity of the work that they plan to conduct.

Limitations and future research

Limitations of the study include the relatively small number of coordinators and volunteers. Furthermore, recruitment predominantly took place through aphasia groups and centres, meaning that the providers may have been unusually experienced and motivated. In fact, all the coordinators and the majority of volunteers had at least two years' experience of working with PWA. The sample also included five individuals who were qualified or student SLTs.

Although there was a range of levels of technological experience and confidence amongst the participants, they had all volunteered to be part of an innovative telehealth project and may therefore have been more receptive to new technology and resilient in the face of barriers than others who have less positive attitudes [38]. Providers also had access to a high level of specialist technical support, which may not be replicable in other settings. Future research should investigate the views of providers with a variety of attitudes to new technology, levels of confidence and experience, in order to gain a more rounded evaluation of the benefits and challenges of delivering the intervention in a virtual world.

The technological barriers identified in this study need to be addressed, in order to improve the accessibility of EVA Park and make it usable for providers who do not have access to specialist technical skills and equipment. Future research should investigate the experiences of clinicians seeking to integrate EVA Park into their clinical caseload, particularly barriers and facilitators and the benefits they perceive. Further research by the EVA Park team is exploring ways of introducing EVA Park into routine clinical settings through a network of "early adopters" [50].

Conclusions

This study found that service providers were able to successfully deliver a structured programme of social support groups in a virtual world, despite encountering technical challenges. The interviews and consensus group discussions indicated that providers found the intervention acceptable. Key benefits were the forging of social connections, the provision of a safe space in which to experiment, ease of access and opportunities for communication. The interviews and consensus group discussions provided rich information about the barriers and facilitators encountered, and how the experience could be improved.

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Data availability statement

Due to the nature of this research, the supporting data are not available to be shared publicly due to ethical restrictions.

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Appendix 1. Topic guide for coordinators/volunteers – EVA Groups interview

Introduction			
Biography			
Work	Interests	Technology	
Group			
Coordinators: Tell me about the group you coordinate (people, how recruited, know previously)			
Volunteers: Tell me about the group you worked with (people, know previously)			
Opening			
Tell me about EVA.	*What was your role? What did your group do in EVA?*	*Activities your group liked/enjoyed more/less?*	
Main			
Experiences of using EVA			
Enjoy?	Getting prepared?	Providing support	Receiving training/support?
Which aspects of training/support were helpful?			
How often?	In between groups?	Duration?	Could it have gone on longer?
How did it change over time?			
Compare to face to face groups	Group bonding?	What helped people feel connected?	
Did you get to know group members (if not previously known)? Did you feel others got to know you?			
What difference did taking part make to group members?			
Communicating/Talking	Social	Taking part in life generally	Trying new things
Using tech	Confidence (meeting new people)	New friendships – are they still in touch? How in touch?	
What difference did being a coordinator/volunteer make to you?			
Improvements			
Anything difficult to use?			
Suggest one change?			
End			
In a nutshell, what are your views about EVA?			
When you think back, what stands out? What do you remember?			
Like to continue using it in your work? In what way?			
Recommend EVA to others?			

Appendix 2. EVA Park group support thematic framework

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1. Personal details
1.1 Family
1.2 Household/living arrangements
1.3 Previous/current employment/voluntary work
1.4 Interests
1.5 Technology use
1.6 Personality/communication style
2. Communication
2.1 Real world
2.2 Virtual world
3. EVA
3.1 Recruitment/referral/reasons for taking part
3.2 World
3.2.1 Places
3.2.2 Environment
3.2.3 Avatar
3.2.4 Play
3.3 Visiting EVA between group sessions
3.4 Group/social aspects
3.5 Training/learning/support
3.6 Length of involvement/sessions
3.7 Technical aspects
3.8 Improvements
3.9 EVA to continue/Future use
4. Service providers' perceptions of impact of taking part for people with aphasia
4.1 Role/identity
4.2 Activity
4.3 Aspects of personality
4.4 Technology use
4.5 Affect
4.6 Confidence
4.7 Communication
4.8 Contributing to research
5. Impact of taking part for coordinator/volunteer
5.1 Role/identity
5.2 Technology use
5.3 Affect
5.4 Confidence
5.5 Developing skills
5.6 Contributing to research
6. Social connectedness
6.1 Before EVA
6.2 During EVA
6.3 Outside EVA
7. Virtual worlds
7.1 Experience before EVA
7.2 Views on virtual worlds
7.2.1 Pre-EVA
7.2.2 Post-EVA
7.3 Differences and similarities between virtual and face-to-face groups
8. Predominant memory of EVA
9. Advice
10. Memorable quotes
Free nodes
11. Affect
11.1 Negative
11.2 Neutral
11.3 Positive
12. Confidence
12.1 Negative
12.2 Neutral
12.3 Positive
13. Facilitators or barriers
13.1 Facilitators
13.2 Barriers

Parent themes in bold, 2nd level in normal font-weight, 3rd level indented.

Appendix 3. Thematic framework – definitions

Theme	Definition
1. Personal details	Information relating the interviewee's background, personal circumstances, interests, use of technology before they started the project
1.1 Family	
1.2 Household/living arrangements	Who/where they live, details about accommodation
1.3 Previous/current employment/ voluntary work	
1.4 Interests	Current or past interests
1.5 Technology use	Their use of technology (e.g., for social, work, leisure etc. purposes) **before** stroke
1.6 Personality/communication style	Comments about personality traits and their communication style (e.g., whether they are talkative, reticent, outgoing, private, and good listeners)
2. Communication	Comments relating to communication
2.1 Real world	Comments relating to communicating in the real world
2.2 Virtual world	Comments relating to communicating in a virtual world (EVA or other platforms such as Second Life)
3. EVA	Any comments relating to EVA
3.1 Recruitment/referral/reasons for taking part	How they heard about the project/how they were referred or recruited/reasons for choosing to take part
3.2 World	
3.2.1 Places	General references to the different locations in EVA Park Specific references to the particular locations to be coded at 4th level.
3.2.2 Environment	Comments about the environment in EVA Park
3.2.3 Avatar	Comments relating to the experience of having an avatar
3.2.4 Play	Comments about the playful/fun/joyful aspects/experiences of EVA Park
3.3 Visiting EVA between group sessions	Comments about experiences in EVA between their main group sessions – these could have been pre-planned meetings or spontaneous. They could involve interacting with others or exploring the world on their own.
3.4 Group/social aspects	Comments about members of the group, including references to subgroups of participants, roles, and relationships or interactions between group members, and how these changed during the project. Comments relating to planned activities and topics.
3.5 Training/learning/support	How they learnt to use the equipment and learnt to operate EVA Park software, training/support they received with technical aspects and participating in/running group activities, e.g., from EVA team, other group members, family members, friends, and carers.
3.6 Length of involvement	Comments about length of sessions and length of project, e.g., whether it was too long or if they'd have liked it to carry on longer.
3.7 Technical aspects	Comments about getting equipment set up (e.g., installing internet connections, logging in to EVA, etc.), equipment used (e.g., laptop, broadband) and about using EVA Park (e.g., how accessible, usable it was).
3.8 Improvements	How the group sessions, therapy manual, technical aspects and EVA Park world could have been improved (e.g., suggested additions/simplifications). Also, improvements that could have been made to the group (e.g., size, management of group).
3.9 EVA to continue/Future use	Whether they would like to continue using EVA in future, how they could envisage it being used, e.g., continuation of group sessions and/or other uses.
4. Service providers' perceptions of impact of taking part for people with aphasia	Changes (positive or negative) due to taking part
4.1 Role/identity	Changes in roles and/or sense of identity
4.2 Activity	Changes in activities in real world
4.3 Aspects of personality	Changes in personality due to taking part, e.g., becoming more out-going/telling jokes
4.4 Technology use	Changes in use of technology beyond EVA group sessions
4.5 Affect	Changes in mood/emotions
4.6 Confidence	Changes in confidence
4.7 Communication	Changes to communication
4.8 Contributing to research	Comments about their contribution to research project/feelings about this
5. Impact of taking part for coordinator/volunteer	
5.1 Role/identity	Changes in roles and/or sense of identity
5.2 Technology use	Changes in use of technology beyond EVA group sessions
5.3 Affect	Changes in mood/emotions
5.4 Confidence	Changes in confidence
5.5 Developing skills	Comments about skills developed
5.6 Contributing to research	Comments about their contribution to research project/feelings about this
6. Social connectedness	Comments about interactions and feelings of connection to others/being part of a group. Could related to quality and number of interactions or cohesiveness of group. Includes negative references to not feeling socially connected.
6.1 Before EVA	Before EVA group sessions started
6.2 During EVA	While the EVA group sessions were taking place
6.3 Outside EVA	Social connectedness in real world
7. Virtual worlds	
7.1 Experience before EVA	Previous experiences of using virtual worlds before EVA
7.2 Views on virtual worlds	
7.2.1 Pre-EVA	Views about virtual worlds that interviewee held before taking part in EVA project
7.2.2 Post-EVA	Views about virtual worlds since taking part in EVA project
7.3 Differences and similarities between virtual and face-to-face groups	Comparisons between groups delivered face to face and in a virtual world
8. Predominant memory of EVA	
9. Advice	Advice they would give to others about EVA/taking part

(*continued*)

Continued.

Theme	Definition
10. Memorable quotes	
Free nodes	
11. Affect	Any comments relating to mood/emotions
11.1 Negative	Negative mood/emotions
11.2 Neutral	Neutral mood/emotions
11.3 Positive	Positive mood/emotions
12. Confidence	Any comments relating to confidence (confidence must be explicitly mentioned, rather than implied)
12.1 Negative	Comments about lack of confidence
12.2 Neutral	Neutral comments relating to confidence
12.3 Positive	Positive comments about confidence
13. Facilitators or barriers	Any comments about facilitators or barriers relating to others themes (e.g., communication/technology/group aspects)
13.1 Facilitators	
13.2 Barriers	

Parent themes in bold, 2nd level in normal font-weight, 3rd level indented.

Appendix 4. Mapping of sections of thematic framework to categories

	Categories	Elements of thematic framework mapped to category
1	Service providers' perceptions of EVA Park as a platform for group social support	1. Personal details 1.4. Interests 1.5. Technology use 2. Communication 3. EVA 3.2. World 3.3. Visiting EVA between sessions 3.4. Group/social aspects 3.5. Training/learning support 3.7. Technical aspects 3.9. EVA to continue/future use 7. Virtual worlds 8. Predominant memory of EVA 9. Advice 12. Confidence
2	Views about the intervention	3. EVA 3.3. Visiting EVA between sessions 3.4. Group/social aspects 3.6. Length of involvement/sessions 3.9. EVA to continue/future use 8. Predominant memory of EVA 9. Advice 11. Affect
3	Emotional responses to the intervention	3. EVA 6. Social connectedness 7. Virtual worlds 8. Predominant memory of EVA 11. Affect
4	Barriers experienced	2. Communication 3. EVA 7. Virtual worlds 13.2. Barriers
5	Facilitators experienced	2. Communication 3. EVA 7. Virtual worlds 12. Confidence 13.1. Facilitators
6	Suggested improvements to the intervention or its delivery	3.0. EVA 3.8. EVA – improvements 3.9. EVA to continue/future use
7	Impact of taking part for service providers	5. Impact of taking part for coordinator/volunteer 11. Affect 12. Confidence
8	Service providers' perceptions of impact of taking part for members with aphasia	2. Communication 4. Impact of taking part for people with aphasia 6. Social connectedness 11. Affect 12. Confidence