Original Research

Successful Online Choir for People Living with Dementia: A Qualitative Case Study

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Abstract

Group singing as a social musical activity can be used to improve the quality of life, well-being, and overall health of people with dementia and caregivers. Online choirs have gained awareness since the COVID-19 pandemic; however, singing in an online choir is an unsatisfying experience for most choir members in the general population. In order to report on the feasibility of creating an online choir for people with dementia, we studied a successful case of such a choir. This choir began and continued online for over a year, maintaining a group of about ten people. The objectives were to understand the participants' experience and explore factors contributing to its success. We surveyed 12 members using closed and open-ended questions (5 choristers with dementia, 5 caregivers, the choir director, and a volunteer). The thematic analysis of the responses revealed that (1) an online choir is better than no choir for participants with dementia, (2) participants sought and found in the online choir an accessible way to socialize and enjoy singing, and (3) obstacles to participate in an online choir (mostly technology-related) are not the same as those to participate in an in-person choir (mostly travel related). The success of this online choir may in part be attributed to the fact that it first

started online (the members did not compare the experience to previous in-person rehearsals and had more flexible expectations); most participants with dementia had mild cognitive symptoms and had extensive previous choral singing experience.

Keywords

Dementia; music; singing; choir; online choir; virtual choir; social participation; art therapy; telemedicine; community arts

1. Introduction

Dementia is a gradual or chronic neurodegenerative disease typically characterized by memory loss and deterioration of other cognitive functions. Also, it affects mood, behavior and emotional control in more advanced stages [1]. Music therapy for people with dementia is increasingly supported by scientific evidence demonstrating increased emotional well-being and quality of life and improved mood, behavior, social behavior, and cognition [2]. Musical leisure activities outside clinical settings are also getting increased attention for healthcare by institutions and states, as there is a growing interest in the social prescribing approach, a method whereby clinicians formally recommend sources of support within the community to patients to help them improve their health and well-being [3]. Community-based music activities have several advantages, including their inherent social aspect and low cost, making them a valuable strategy to supplement health services for large populations with chronic health conditions such as dementia [4, 5].

Group singing, or choir singing, is a common and accessible form of community music-making that offers many health and well-being benefits for people living with dementia, including the significant reduction of pain and anxiety, improved cognitive processes and quality of life [6-9]. It can result in psychosocial well-being [4], and long-term emotional well-being [10], as well as assist in patients coming to terms with their diagnosis leading to a better quality of life [11]. Group singing can modulate behavior, emotion, and mood [7, 11-14]. These moderating effects have been observed to lead to a decrease in prescribed antipsychotic drugs in people with Alzheimer's Disease [15]. The participation of a caregiver is often required in choirs organized for people living with dementia. Such dyad participation can enhance the relationship between the family caregiver and the person who has dementia, increase well-being for both, as well as lead both to foster new empathetic friendships with other caregivers and people with dementia and enlarge their support system [8, 9, 11, 16].

Group singing is traditionally thought to be in the form of in-person choral singing. However, in recent years, there has been a shift toward experimentation with online choral singing in the general population, because choirs could no longer gather in person during the COVID-19 pandemic. Online choir allowed people to continue practicing choral singing, and even present virtual concert performances. We define a virtual choir as the product of synthesized individual recorded vocal contributions. In contrast, an online choir is the process of a group of singers that rehearse together remotely by technological means. The present study focuses on the latter with people with dementia. An obvious advantage of the online choir is that participants do not need to travel to the rehearsal site. For clinical populations such as people with dementia and their loved ones, this can

be crucial in giving them access to this social activity. However, most studies of online choirs in the general population have reported several drawbacks that significantly decrease choir member satisfaction.

An important limitation of the online choir is latency issues over conference software, making singing together (synchronously) not feasible. Members must mute their microphones during online rehearsals and can only hear the choir director. Recent studies in the general population have revealed chorists' dissatisfaction with online choirs compared to in-person choirs. Observations and participant reflections exposed many social, communicative, and musical limitations, including an increased effort of the choir director to engage choir members, difficulty for the choir director to gauge if individual members are struggling online, and social interaction during rehearsals requires a higher priority to compensate for the communicative barriers of technology [17, 18]. Some choir members reported losing the joy of being in a choir when it was moved online, many choir members quit when their choir moved online [17-19], and the sound quality of the experience of the in-person choir cannot be reproduced online [17]. One study revealed that the choir members felt less connected to the music online, and many determined that they did not like their isolated voices; they described the experience as similar to karaoke which was not satisfactory for many [19]. Furthermore, working on the choir's sound is challenging when members must remain muted [18, 20]. Many limitations to the online mode were also observed and reported regarding the technological requirements for an online choir, including the lack of suitable equipment and a lack of knowledge of how to operate the technology and equipment, especially for older people [19-21]. There is also a financial burden to obtain suitable equipment, many people experience Zoom fatigue and challenges in ensuring digital security and privacy, and some surveyed choristers reported being afraid of disturbing others in their home making it difficult to sing without being constrained [19, 21]. Many survey respondents believed that an online choir was better than no choir, but an online choir was inferior to an in-person choir [19].

Whether it is possible to successfully conduct an online choir with people with dementia is questionable given the many limitations of this form of choral practice already reported. However, Dowson & Schneider [22] identified a lack of studies on the topic. These authors then led a community case study on recent practices in online music-making in response to COVID-19 restrictions for people with dementia in the UK [21]. Over 50 examples of online music activities were identified, of which 19 were predominantly singing music activities, including Singalong (n = 8), Singing group (n = 10) and one Choir. A subsequent study surveyed twelve facilitators of dementia-inclusive choirs in Ireland to determine how they adapted their programs in response to COVID-19 restrictions, and how they perceived their adapted programs. The survey analysis revealed four themes: (1) online choirs are accessible and inclusive but technology is a barrier, (2) in-person singing is an irreplaceable experience but online choirs are a valuable substitute when singing in-person is not possible, (3) online choirs fulfilled social needs during lockdown isolation which some of the facilitators identified as being possibly more important than the musical aspect of the program, and (4) a high level of adaptability to the online mode was observed which is especially significant for those with dementia [23]. We also found documented information on a specific dementia-inclusive online choir, "the CeleBRation choir", originally established in person in 2009 for people with various neurological conditions and their significant others [24]. This choir temporarily moved online due to the pandemic and this mode of delivery is currently under analysis

by researchers, with available reports indicating that people living with dementia were able to demonstrate active engagement during singing sessions [25].

It is important to note that most documented online choirs already existed in person before they made a forced online transition. Thus, one possible reason for these successful online choir experiences may be that a strong sense of belonging to the group was pre-constructed in person and may have supported motivation to participate in subsequent temporary online rehearsals. We found only one documented choir launched online during the pandemic, as part of an undergraduate research project [26]. The three participants in this study demonstrated varying levels of engagement, which the authors related to the degree of dementia severity. Given the potential benefits of group singing for this population, and because the online mode eliminates the important logistical barriers of traveling to a rehearsal site, there is a need for more studies on the success factors of online-launched choirs for these people. We had the opportunity to meet such a choir.

2. Objectives

This study aimed to report on the feasibility of creating an online choir with people living with dementia. The objectives were to understand the participants' experience in such a choir, particularly about criticisms reported by choir members in the general population about the online mode, and to explore factors contributing to its success.

3. Materials and Methods

3.1 Qualitative Approach and Materials

A qualitative case study method was chosen given the rarity of online-launched choirs for people with dementia. We adopted a phenomenological approach in surveying the lived experience of the different choir members. Since we were specifically interested in the online choir mode, we designed a questionnaire with open-ended reflective questions about the participant's experience in the online choir. We allowed them to comment or respond to the main criticisms reported in the general population about online choir participation. Open-ended questions are listed in Table 1 (questions to the choir members) and Table 2 (questions to the choir director). Closed-ended questions were also included for demographic information.

Table 1 Open-ended survey questions to the choir members.

1	What motivated you to join this online choir?
2	What motivated you to stay in this choir?
3	What problems of barriers (if any) did you have to overcome to participate?
4	What are the advantages for you (if any) to participating in a choir online compared to an in-person choir?
5	Would you continue to participate in this choir if rehearsals were in-person? Please explain.
6	Please share your thoughts on the following statement: "The sense of "community" that a choir provides cannot be done remotely, regardless of the platform you choose."

7	Please share your thoughts on the following statement: "An online rehearsal cannot replace the group experience provided by choral."
8	Please share your thoughts on the following statement: "It may be a challenge for some choristers—particularly older adults and those without regular access to computers or strong internet connectivity—to use virtual platforms."
9	Is there anything else you would like to share about your experience with [the online choir]?

Table 2 Open-ended survey questions to the choir director.

1	What motivated you to get involved in this choir?
2	What are the main differences between the direction of an in-person vs. online choir?
3	What problems or barriers (if any) did you have to overcome to organize the online choir?
4	What are the advantages for you (if any) of a choir online compared to in-person choir?
5	Please share your thoughts on the following statement: "The sense of "community" that a choir provides cannot be done remotely, regardless of the platform you choose."
6	Please share your thoughts on the following statement: "An online rehearsal cannot replace the group experience provided by choral."
7	Please share your thoughts on the following statement: "it may be a challenge for some choristers—particularly older adults and those without regular access to computers or strong internet connectivity—to use virtual platforms."
8	Is there anything else you would like to share about your experience with [the online choir]?

3.2 The Choir of Interest and Its Relation to the Researchers

The choir under study is an online intergenerational community choir for people with memory loss, their caregivers, and friends, partnered with a dementia-support local organization. It was not initially intended to be an online choir but ended up launching as an online choir in September 2020 due to the COVID-19 pandemic. It continued for more than a year in this online mode, maintaining a group size of about ten people. The sessions were delivered through an interactive synchronous format (on the platform Zoom) where members apart from the choir director had to remain muted. Rehearsals were one hour long and were structured in four-part sessions beginning with a vocal warm-up, followed by "sing-song" where the choir would sing two-to-three well-known songs. After the sing-song, the choir worked on repertoire then concluded the rehearsals with conversation time for the choir members to socialize. All members of the choir have a participating family caregiver. The online choir produced four virtual choir performances. The choir switched to the in-person mode when possible (November to December 2021, and April 2022 to present). We conducted the survey in November and December 2021 after a year of online rehearsals and the brief switch to in-person rehearsals.

The choir was introduced to the study's last author (A.Z.) in October 2020 by a person in the research community. A.Z. first participated as a chorister in the choir and realized how unique this online choir was. The project was designed with the approval of the choir director. Data collection and analysis were supervised by A.Z. but were conducted by the first author and a research assistant

unknown to the choir members. This was done to maintain the primary community and musical relationships between A.Z and the participants, and to help participants feel free to express all their opinions.

3.3 Participants

To adequately represent this choir case, we aimed to include the choir director and as many choir members as possible in the study, as long as they had at least three months of online experience with it. Out of 14 eligible members, 12 agreed to participate in the study. Five participants suffered from memory loss, five were the corresponding caregivers, one was the choir director, and one was a volunteer. Participant demographic information is available in Table 3. Dementia severity was measured for each of the participants with memory loss by obtaining a Clinical Dementia Rating score using a validated caregiver's questionnaire (the Alzheimer's and Dementia Online Quick Test available at dementiacarecentral.com). The choir director (CD) is a retired choir director and organist and had 43 cumulative years of choir directing at the time of the study. The CD was exposed to dementia through family members and working four years in long-term care hospitals as a nursing assistant. Ethics approval was obtained from the Health Sciences and Sciences Research Ethics Board at the Office of Research Ethics and Integrity of the University of Ottawa (Study approval ID H-08-21-7258), and all participants gave written informed consent.

Table 3 Choir's demographic information.

	N	Female/Male	Age, mean (range)	Number of participants with mild/moderate/severe dementia symptoms	Number of participants with none/some/extensive experience in music making	Number of participants with none/some/extensive previous choral singing experience	Months in the choir, mean (range)
People with dementia or memory loss	5	1/4	79 (74-88)	4/1/0	0/0/5	0/0/5	7 (3-15)
Caregivers and one volunteer	6	5/1	71 (54-81)	-	0/2/3	1/2/3	7 (3-15)

3.4 Procedure

The survey questionnaire was sent by email to the participants. They had the option of printing and filling it out themselves, then returning the scanned copy to the research team (half the participants chose this option), or having the survey administered through an interview on the Zoom videoconferencing platform with the project's research assistant. One pair of participants experienced internet connectivity issues during the survey process on Zoom, so a phone meeting was arranged for another day to complete the survey. The videoconferencing format was offered because the participants had experience using Zoom through their online choir practices. Additionally, based on our knowledge and experience with the population of the study, we anticipated that seeing the person speaking and their body language is useful for conversational understanding compared to a phone interview for example. As expected, the participants who selected the Zoom survey method could participate in the online discussion with no difficulties, except for the couple who experienced connectivity issues. Discussions were audio-recorded via the online platform or phone app and answers were transcribed by the first author on the survey forms.

3.5 Analysis

The first author prepared an anonymized document collecting all the responses of the choir members for each open-ended question for thematic analysis. Because the responses were relatively short, she produced written syntheses question-by-question. The last author revised this analysis. A few minor disagreements were discussed and resolved. Data from the choir director who had answered slightly different questions were first analyzed separately. Lastly, themes common to all participants were identified for a final synthesis.

4. Results

We present below first the synthesis of the choristers' results question by question, then the results of the choir director and last, the general synthesis.

4.1 Choristers

4.1.1 What Motivated You to Join This Online Choir?

The factors that motivated participants to join the choir varied. Most of the participants joined for their interest in singing and for a social activity to participate in during lockdowns (e.g., "Isolation due to Covid-19" CG02; "My husband has some memory issues and I love to sing" CG03; "I love to sing in a group" PD05;). Some participants were asked to join by the choir director personally, or they heard of it through word-of-mouth or the dementia-support local organization. Many of the participants with dementia were already members of choirs before the pandemic and were saddened when their choirs could no longer meet in person. This online choir offered an opportunity to continue singing and being a member of a group during lockdowns which is what attracted most of the members ("My other choirs would not let me sing in person, and I could not gather in groups, so this choir was something that I could have in my home" PD01). Other participants reported the accessibility of the choir as being a motivation to join, as well as the fact that this choir was specifically intended for people with dementia and their family and friends ("Partly looking for some

activity that we could participate in that would give [PD05] some stimulation and be in his areas of interest. I sought out the activity and heard of it through the [dementia-support organization]" CG05; "It was accessible and did not require me to travel to rehearsals" PD03).

4.1.2 What Motivated You to Stay in This Choir?

Most participants reported staying in the choir because of its social aspect and their enjoyment of singing and being part of a choir. All the participants indicated that the choir was beneficial in some way, whether socially, musically, or as a fun way to keep busy ("Songs, social aspect, good choir leader" CG02; "The fun of singing and bonding over music with other people through joint expression" PD05; "It was kind of fun for me, but mostly because [PD05] was getting something out of it" CG05). Both participants of a person-with-dementia and caregiver dyad supported their decision to stay in the choir by explaining that an online choir is better than no choir ("There wasn't much else to do. Online choir was better than nothing; it was worth it and a great experience so far" CG01). One of these participants expressed strongly associating their sense of identity with being a member of a choir, stating they "would be lost if [they] had no outside sharing [of singing] with other people" (PD01).

4.1.3 What Problems or Barriers (If Any) Did You Have to Overcome to Participate?

Most participants reported not having to overcome barriers to participating in this online choir. One caregiver disclosed that it was challenging to encourage their spouse to participate, and a few participants reported technological difficulty operating Zoom or their devices. One of these participants also reported never having sung in a choir before. They were faced with learning how to be a chorister and learning how to operate the required technology ("Never having sung in a choir myself, it was a new experience to take that on at my age. This was more difficult than learning the online format" CG05). A different participant with worsening hearing loss expressed difficulty coping with the online method because it was more difficult to hear people speaking through a device than in-person. This was especially tough during the conversations in the social periods of the rehearsals and while recording the virtual choirs. This participant had to record their vocal contribution without the musical accompaniment due to difficulty hearing the computer speaker, and their (and their caregiver's) lack of technological skills.

4.1.4 What are the Advantages for You (If Any) to Participating in a Choir Online Compared to an In-person Choir?

The most common response to this question was that the online choir eliminated the need for travel, saving both time and the cost of travel, implying that online choir is more accessible. One participant said that singing in their home through their device offered them a new opportunity and a relaxed way to improve their singing skills. ("I can sit at my kitchen table and hear my own voice clearly. I am more aware of mistakes, and you can see yourself singing. You can improve at home more easily than when voice is blended in a choir" PD01). This participant's caregiver echoed that online choir is easier for aging individuals to hear than an in-person choir. Some participants stated that online choir was simpler and more fun, and non-competitive with no judgment ("The online choir had fewer expectations of the participants, making it simpler. This was good" CG04; "You can

do it more for the fun of it and not worry about judgment or criticism" CG01). One of these participants expanded their response to mention that online choir was more comfortable compared to the alternative during the pandemic which required the use of singing masks. Another participant claimed that online choir was a social supplement during lockdowns when they and their spouse were unable to do their regular activities. However, despite the convenience and benefits of the online choir, a participant mentioned the superiority of the in-person choir experience ("The quality of the experience would be better in person" PD04), and three of the participants reported no advantages to the online choir over the in-person choir.

4.1.5 Would You Continue to Participate in This Choir If Rehearsals Were in Person? Please Explain

All participants with dementia reported that they would continue to participate if the choir were in person except for one due to a geographical barrier; consequently, the caregiver of this participant would also be unable to participate in person. One of the caregivers reported that they would only continue if their spouse wanted to; this participant struggled with technology and had no prior choir experience. Another caregiver expressed uncertainty about whether they would continue to participate in the choir if it were in person because they felt that the participants' expectations would be quite heavy and challenging for the population of the choir. Overall, most of the participants enthusiastically agreed that they would continue to participate if the choir rehearsals were in person ("Yes for sure. It's also convenient that the rehearsal location is really close to us" CG01), and two of the participants stated that they prefer to sing in person ("Yes, singing in person and hearing the other members is what a choir is about" VL01). One of the participants who left the choir stated that they would consider rejoining if rehearsals were in person because they believed it would be easier to hear with their hearing impairment.

4.1.6 Please Share your Thoughts on the Following Statement: "The Sense of "Community" That a Choir Provides Cannot be Done Remotely, Regardless of the Platform You Choose."

Most of the participants disagreed with this statement. They believed that this online choir did foster a sense of community ("You can bond over the music with people and share music with them over online platforms, and that type of connection is convenient for some people like the elderly or people with physical barriers who cannot get out" PD01; "There was quite a sense of community when it was done online. There was one couple that participated from [remote city], and I think they felt quite a sense of community." CG04). Two participants openly agreed with the statement in the question and two other participants were unsure ("It can be done, it is just more difficult because you're dealing with an older population who are not as computer literate and people with dementia or possibly hearing problems; the interaction becomes more difficult to create because of this" CG05). One theme that many participants shared is that although in-person choir is more desirable, communication, social bonding, and bonding over music are all possible through online platforms, and online platforms are more accessible. Accessibility in the context of the participants' responses refers to accessibility for elderly people or people with physical barriers who cannot travel, for geographically dispersed people, and in circumstances where in-person events are not possible or permitted. One of the caregivers suggested that the online choir mode may have created a stronger sense of community than the in-person mode because everyone is engaged in the conversation online ("In person, everybody is divided into their pairs (caregiver-patient) and it is

difficult to get people to mingle because people with dementia need a routine and need to know where they are, getting up and moving around upsets that routine making it stressful" CG04).

4.1.7 Please Share Your Thoughts on the Following Statement: "An Online Rehearsal Cannot Replace the Group Experience Provided by Choral."

The main theme from the responses to this question was that online choir and the group experience of the in-person choir are difficult to compare because they are different types of experiences ("I agree. However, it is a different kind of experience" CG02; "Online choir is a very valuable experience that I had never considered. It serves a different function than in-person choir" PD01). Some participants expressed that group singing is more desirable and beneficial than online choir for better music quality and the sensation of singing in a group and hearing the others around you. However, three participants said that online choir was worthwhile despite the difference in experience ("Online choir can't replace the sensation of choral singing, but it would replace it if in-person choral singing was not possible. Online choir is better than nothing" CG02). Accessibility was mentioned again in the responses to this question as participants explained that online choir is more accessible for people who cannot travel due to health or weather, and during circumstances like lockdowns; these participants believe that online choir can replace in-person choir under these types of circumstances. One participant expressed that the experience of in-person rehearsal is difficult to reproduce online, unless the members already know each other and have experience singing together, because the online mode imposes a communicative handicap on people who rely on body language ("It's very hard to replicate unless you have a body of people who already know each other and have experience singing together. We, especially people with dementia, read body language when we interact and that cannot be done online" CG05). Lastly, only two participants outwardly disagreed with the statement, and one justified that online choir rehearsals cannot replace group singing because "Zooming is not choral singing" (VL01).

4.1.8 Please Share Your Thoughts on the Following Statement: "It May be a Challenge for Some Choristers—Particularly Older Adults and Those Without Regular Access to Computers or Strong Internet Connectivity—to Use Virtual Platforms."

Only one participant (with dementia) disagreed with this statement saying that online choir rehearsals are simple and convenient. However, the caregiver asserted that this participant would not have been able to participate in this online choir had they not set up the internet and technology for the participant and been there to assist. This caregiver acknowledged that technology would be a definite issue for some people. Based on the responses of both the caregivers and the people with dementia, it is evident that those with dementia depended on their caregivers to operate and manage the technological aspect of participating in the online choir. One participant openly admitted that they would not be able to participate in the choir without their caregiver assisting them in using the virtual platforms ("I would not be able to use virtual platforms or participate in this choir without [CG05]" PD05). Some technological challenges in the conversations surrounding this question included computer and/or internet access, difficulty operating Zoom, and poor sound quality on Zoom ("Some people were really struggling, and you have to have somebody around to manage it." CG04). However, the caregivers in this choir did manage to connect to the platform and

participate for several months ("Yes, it is quite difficult, but it is not impossible to overcome and learn" CG05).

4.1.9 Is There Anything Else You Would Like to Share about Your Experience?

All but two participants (one participant with dementia and a caregiver) responded to this question. The advantages of the online choir mode and the different purposes of the online and in-person choir were reiterated ("The pros might outweigh the cons for online choir because it has so many advantages: no need to travel or endure going out in cold weather, saves time, more comfortable at home, still get the socialization, still get to sing, but in person choir would offer a better teaching experience. It depends whether you want to just enjoy yourself and have fun or really want to improve and be competitive" CG01; "Running a choir for people with dementia should be for people to enjoy the process and being there and making music, not about a goal or a result" CG04). Two participants said that the in-person mode offers a better teaching experience ("It is far easier to learn from the choir director in person than on Zoom. Zoom distorts music, we can watch the director's body action as well as her faces" VL01). Two caregivers praised the effort and dedication of the choir director ("I really appreciate the effort that the choir director puts forth, including sending both the song lyrics and music via email" CG02). However, one of these participants was also critical. This participant noted the burden placed on caregivers for their family members to be able to participate in activities such as these and suggested that those who had difficulty with technology may have had an increased burden. This participant also expressed that online choirs could be quite successful if the caregivers know how to operate technology, the caregiver is very committed, and the participant with dementia only has very mild cognitive deficits, or if participants with musical background and no cognitive deficits want to join ("[This online choir] could be broadened out to seniors with choral experience who just aren't able to get out anymore" CG04). Four participants expressed again enjoying the experience of the online choir and stated that it served the purpose of connecting people through music at a time when people were forced into social isolation. Finally, a participant mentioned that this experience was an opportunity to learn to use new technology ("I did not use the computer/tablet much at all before covid and the online choir. I found that it has been a positive addition to my life during a time of social isolation and lockdowns and I love the musical opportunities I can explore with it" PD01).

4.2 Choir Director

The CD was inspired to start a choir tailored to people with dementia and cognitive impairments after retiring because they had personal experience with people with dementia and read about other similar (in-person) choirs. For the CD, the main difference between the direction of an in-person and online choir is that the online mode requires choristers to be muted while singing due to the sound lag on Zoom, which gives no choice but to guess when corrections or assistance is needed. The CD finds that "it is not as easy to discuss any matter pertaining to the choir and their singing online"). In order to organize this choir, the CD had to develop better computer skills, including becoming more comfortable with scanning music and e-mailing it to choristers. The CD noted some logistic advantages of the online choir, including again that it eliminates the need to travel to rehearsals ("I did not have to leave home to conduct a rehearsal. Choristers did not have to leave home to go to rehearsals. Choristers did not have to put on/take off winter clothes and

boots. People in another city can participate in an online choir."). The CD also mentioned that the online mode saves the task of serving refreshments during rehearsals. They believe that online choir can provide a sense of community which is demonstrated in this online choir through the socialization periods where members interacted and built relationships ("Sometimes there was a topic chosen for this but sometimes we just talked about anything that came up. Both of these helped us develop a reasonably strong sense of community"). The CD noted that the online choir can provide community, a pleasurable experience, build self-confidence and self-worth, and choristers can learn through the online choir. However, it does not cultivate the same feeling of working together to achieve a common goal experienced through the in-person choir. Lastly, the choir director mentioned that two of the members had dementia that progressed to the stage that they could no longer function in a Zoom choir practice and had to quit, but they emphasized that despite the limitation, "there is a place for an online choir in today's world."

4.3 Results Synthesis

There was variability in the responses, but the predominant theme is that an online choir is better than no choir for people with dementia. Participants agree that the in-person choir offers a better experience, but they sought and found in the online choir an accessible way to socialize and enjoy singing. Obstacles to participating in an online choir (mostly technology-related) are not the same as those to participate in an in-person choir (mostly travel related). Lastly, caregivers and volunteers were more critical than the people with dementia, but all reported enjoying the online choir, even those with less musical experience.

5. Discussion

The overall aim of the present study was to document the feasibility of online choirs for people with dementia using a successful case example, and more specifically to understand participants' experience in the online mode and the factors behind its success. The choir we examined began online with members living with mild to moderate dementia symptoms, their caregivers, and a few volunteers. It continued for over a year in this online mode, maintaining a group of about ten people, and even produced four virtual choir performances. Our results point to several factors that may explain this success, including the social benefits and physical accessibility advantages, despite the technological barriers to overcome.

5.1 Social Benefits and Accessibility of Online Choir

Many social benefits of the online choir mode were reported in our study, most notably the ability to connect with others during a time of lockdowns and social isolation. Many of our participants joined this online choir as a substitute for in-person choir when their regular choir groups stopped gathering in person, and to participate in a social activity during lockdowns and social isolation imposed by the pandemic. These results are consistent with recent reports that concluded that online choirs offer a sense of connection between people when the in-person connection is impossible [19-21, 23, 25, 27, 28].

The survey responses from our study echoed the view that social fulfillment from the online choir is less compared to the in-person choir. However, out of the twelve participants surveyed in our

study, only two agreed that the sense of community that a choir provides cannot be done remotely. Most participants reported experiencing the social benefits of the online choir. They partly credited their enjoyment of the experience to the social aspect of the choir, which also fueled their motivation to continue participating in the choir.

The online choir allows larger communities and networks to grow by allowing people in remote locations to participate. We observed this capacity in our study with two participants residing outside the region of the choir. Online choirs are also more accessible by eliminating travel time to and from rehearsals and eliminating travel risks (including poor weather conditions), which enable more people to participate like those with physical disabilities who cannot travel easily and those without access to transportation [15, 18, 19, 21]. The topic of eliminating travel burden in the online choir format was reflected in conversation themes in our survey responses with our participants specifying that online choir eliminated the burden (safety risk, time, and economic cost) associated with traveling to rehearsals making it more convenient. Eliminating travel is also a social benefit because the time saved can be put toward other meaningful activities or establishing a less demanding routine that allows for a better and more comfortable lifestyle, especially for populations that experience the burden of travel more heavily. Furthermore, the online choir is accessible to people who lack the confidence to sing publicly because they would be muted on whichever platform the choir uses and could correct their errors privately. At the same time, they build the confidence to potentially join an in-person choir in the future [21].

In addition to accessibility, some of the participants from our study credited their motivation for joining the choir to the fact that it is intended for people with dementia and their family and friends. These participants were likely motivated by the supportive nature of groups that are meant for people with disabilities and sought social support from like-minded people in similar positions, especially in a time when social gathering in person was not an option. The idea that group/choral singing can function for both social and emotional support among people with dementia has been highlighted in prior research [9, 11, 16].

5.2 Challenges of Technology for Online Choir

Only one participant disagreed with the statement that especially older choir participants may find the technology required for the online choir challenging. This participant said that having choir rehearsals on a device at home is simple and believes anybody can learn how to operate technology for online platforms. However, it is very likely that this participant only found online choir so simple and accessible because their caregiver is younger and more technologically adept than the other caregivers surveyed and was able to offer more technological assistance.

Technology is a major disadvantage of the online choir. Latency is the most obvious technological barrier as it makes singing synchronously not feasible through most video conference platforms [18-21, 25]. Other disadvantages reported in our survey are also congruent with previous research including lack of computer and/or internet access and difficulty operating Zoom [20, 21, 25]. Additionally, long-term care populations may experience greater difficulty paying attention to a device screen for extended periods, making online choirs more challenging and potentially less beneficial for that population [21].

Reflecting upon the sound quality of Zoom, one caregiver reported that online choir was better for his mom who is somewhat hard of hearing because the sound was clearer coming through the

tablet speaker without the background noise of live gatherings or being far away from the choir director. This result contradicts the response of a different caregiver and spouse who reported that the participant with dementia had great difficulty coping with the online choir because of their diminished hearing since the sound from their device's speaker was too quiet. It is possible that those who reported that online choir was better for their diminished hearing had better sound equipment than the other pair of participants because those who reported the online choir being difficult for hearing also reported many technological issues and were less skilled with technology and therefore may not have the appropriate equipment.

Despite several possible technological issues in online choirs, only three participants reported having personally experienced technological barriers to participating in this online choir. It is remarkable that the choir managed to record four virtual performances, especially considering virtual choirs require more advanced technical skills and the simultaneous use of two devices. Online choirs may facilitate virtual choirs because the participants would already be familiar with some of the required technology. Furthermore, a virtual choir is a logical substitute for traditional concerts that in-person choirs typically perform since they can both showcase the choir's progress. Virtual choirs grant the ability for singers to re-record their virtual choir contribution until they are satisfied with their performance and have minimized errors [29]. Technological effects can be added to virtual choir performances to enhance the recordings and videos and to correct errors for a more polished performance [27]. The fact that the surveyed online choir produced four enjoyable virtual choirs without employing special effects, polishing, or technological corrections demonstrates that the choir was successful and thrived while exceeding expectations. This suggests that technological challenges may be overestimated and older adults including those with dementia can together overcome these challenges more than expected. This is promising for future generations of older people who will be even more familiar with technology and will be that much more capable of participating in online and virtual choirs, and other socially prescribed activities.

5.3 The Singing Experience in an Online Choir

Choir members surveyed in recent studies reported that singing online while muted resembled singing karaoke style. Despite some surveyed choir members not enjoying this aspect of online choir [19], others reported that singing online in karaoke style is beneficial because singers can hear their voices which made many of them aware of their vocal strengths and weaknesses and encouraged them to work on vocal technique at home [25, 29]. This contrast in opinion was reflected in our study with some participants becoming more aware of their voice leading them to self-improvement and others believing that online choir is not authentic choral singing. The latter stance might be shared among some participants because most are accustomed to traditional in-person singing.

A few participants stated that online choir was simpler, more relaxed, and more fun because of fewer expectations. However, one caregiver felt that the expectations were heavy and challenging for the dementia population. The overarching view of the quality of instruction of online choir in the general population is that in-person instruction would be more effective (especially in competitive choirs). In the case of choirs with people living with dementia, the instruction experience would probably depend more on the severity of the cognitive symptoms than the mode of delivery.

5.4 Context of This Online Choir

The general dissatisfaction with online choir compared to in-person choir outlined in the existing literature could be caused by choristers experiencing the benefits and advantages of in-person choir before experiencing the online format which would have led to the formation of different expectations and goals that were not realistic for the online format. The high member satisfaction of this online choir may be due to the choir commencing online rather than in-person and moving online during the pandemic. The members of this online choir chose to join knowing that the choir would be online and that there would likely be logistics to sort out as it was in its pilot phase. Therefore, despite most of the members of the choir previously participating in in-person choirs and experiencing the advantages of in-person choir compared to the online choir, the online choir is very fulfilling and enjoyable, and successfully serves its function of establishing a choral community that provides social support and bond over music.

Important individual factors that likely played into the success of this online choir are that most participants had extensive previous choral singing experience and had only mild dementia symptoms. On a few occasions, two different participants had dementia that had progressed to the stage that they could not function in a Zoom choir practice; their family members soon realized this, and they stopped attending rehearsals. These results are consistent with the online choir implemented as an intervention by Parrott who found that participants with mild-to-moderate dementia could stay actively engaged in the online choir; however, those with more severe dementia required tactile support [26]. For the CeleBRation choir, it was a success [25], but the fact that the participants already knew the other members and staff from participating in the in-person choir first was an advantage that played into the success of the temporary online mode [24]. Therefore, the success of the online choir we have surveyed is significant in the context of the existing literature.

5.5 The Future of Online Choir: Online Choir is Better than No Choir, and Serves Other Functions than in-Person Choirs

One major recurring theme in our survey responses is that an online choir is better than no choir. This theme is particularly interesting because it has been identified in prior research regarding online choir experience in the general population and people with dementia [19, 25]. The online choir was an opportunity to continue sharing the joy of choral singing and to build social and supportive relationships during an unprecedented time of lockdowns. In normal times, there may be other barriers to participating in an in-person choir, foremost among which is geographic distance. The online choir example we have documented shows a possible solution to enjoying both the musical and social choral experience. Technological barriers are present online, but it is also possible to learn how to use technological tools, and the next generations will become increasingly familiar with telecommunication technologies.

We believe that future research needs to make a distinction between traditional choral singing and choral singing in a modern technological society. The inconsistency in the perceived authenticity of online choral singing demands a review of the existing definition of choral singing to be reflective of modern practices and methods. Despite limitations, the online choir can still offer instruction and a valuable experience but has a different function. Additionally, the feasibility of the bi-modal (both in-person and online) format of the choir should be assessed for people with dementia. The bi-

modal choir may make the experience for those singing remotely feel more like authentic choral singing by being able to hear some voices blended together, while still providing remote access for people who cannot travel or are more comfortable participating remotely. Lastly, the feasibility of online choirs for people with dementia who have little, or no prior musical or choral experience should be assessed.

5.6 Limitations

As with any case study, the generalizability of the results is limited. However, it is interesting to note that the participants' experience is consistent with the literature on online choirs for people with dementia [23]. In our study, in addition to surveying the choir director we surveyed choir members directly, including those living with dementia. Symptoms of dementia can make it difficult to gather the opinions of participants. For this reason, the Zoom and telephone interviews were conducted with dyads made up of participants with dementia and caregivers, the latter sometimes having to help people with dementia understand the questions and refocus during the discussion. We believe that people who completed the survey form independently were also helped by their caregivers to complete and submit it. No difficulties were reported with either survey modality, and we obtained different responses from members of the dyads, suggesting that our results represent the views of participants living with dementia, despite communication barriers related to cognitive impairment.

It should be noted that our participants' dementia symptoms were mostly mild, which may not represent all choir members. We did not document the severity of the symptoms of the choir members who were not eligible (e.g., who had participated less than 3 months at the time of the survey) or did not give their consent to participate. However, according to A.Z. (an experienced speech therapist, who sang in the choir), their degree of impairment seemed similar to that of the participants included in the study (i.e., mostly mild degrees and no severe degrees).

Another potential limitation of this study is that participants may not have expressed all of their negative criticisms knowing that the research team's director was also a choir member. To limit this influence, contact between the principal investigator and the participants was avoided. Negative opinions among participants indicate that at least some freedom of speech was present. Lastly, our investigation did not explore participants' experiences with virtual choir, which may be a different experience than an online choir.

6. Conclusion

Based on the experience of the online choir that we studied and online choirs described in existing literature, online choirs are feasible for populations with mild to moderate cognitive impairments, those with physical disabilities or barriers that make them unable to travel to in-person choir rehearsals, or those with no cognitive impairments or physical barriers. When implemented for populations with cognitive impairments, it appears necessary to have a caregiver participate in operating the technology and in helping keep their family member engaged and focused during the rehearsal. Online choir and in-person choir have different functions. In-person choir allows a deeper engagement with music. However, the online choir is more accessible. It can be implemented as a convenient method of musical engagement and social opportunity for various circumstances where the in-person choir is not feasible. Given the advantages of the online choir,

the effects of this choir mode would be interesting to examine as a social prescribing approach for dementia and other populations.

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Author Contributions

Conceptualization, A.Z.; methodology, A.Z.; validation, A.Z.; formal analysis, R.M.; investigation, R.M.; resources, A.Z.; data curation, A.Z.; writing—original draft preparation, R.M.; writing—review and editing, RM and A.Z.; visualization, R.M.; supervision, A.Z.; project administration, A.Z. All authors have read and agreed to the published version of the manuscript.

Competing Interests

The authors have declared that no competing interests exist.

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