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The Feasibility of Remotely Delivered Exercise Session in Adults with Alzheimer Disease and their Caregivers

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Abstract

Adults with Alzheimer's disease (AD) and their caregivers represent a segment of the population with low levels of moderate physical activity (MPA) and limited options for increasing MPA. The purpose of this study was to evaluate the feasibility of a group video conference approach for increasing MPA in adults with AD and their caregivers. Adults with AD and their caregivers attended 30-minute group exercise sessions 3x/wk for 12wks. Exercise sessions and support sessions were delivered in their homes on a tablet computer over video conferencing software. Nine adults with AD/caregiver dyads enrolled and seven completed the 12wk intervention. Adults with AD attended 77.3% of the group exercise and caregivers attended 79.2% of group exercise sessions. Weekly MPA increased in both adults with AD (49%) and caregivers (30%). Exercise delivered by group video conferencing is a feasible and potentially effective approach for increasing MPA in adults with AD and their caregivers.

Keywords

Alzheimer Disease; exercise; caregivers; technology; remote delivery; physical activity

BACKGROUND

The unprecedented growth of the elderly population has been accompanied by an increased prevalence of Alzheimer Disease (AD), now affecting nearly 1 in 9 adults over age 65(Alzheimer's Association, 2017). AD is a progressive, irreversible brain disease

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characterized by amyloid plaques and neurofibrillary tangles in the brain which are associated with the deterioration of brain function resulting in cognitive decline, behavioral and psychiatric symptoms and reductions in functional status including the ability to complete activities of daily living (ADL) and self-care (Alzheimer's Association, 2017). Physical activity may provide an accessible, practical and economical non-pharmacologic approach for the management of AD. Participation in moderate intensity physical activity (MPA) may allow patients with AD to maintain cognitive and physical function and quality of life as the disease progresses, without the side effects associated with currently available medications. Martin-Ginis et al (Ginis et al., 2017) recently developed an evidence based public health messaging statement for the use of physical activity for the management of symptoms and complications of AD based on a systematic review of 20 systematic reviews (121 unique studies) on this topic and concluded that "Among older adults with Alzheimer's disease and other dementias, regular physical activity can improve performance of activities of daily living and mobility and may improve general cognition and balance" (Ginis et al., 2017). Thus, increased physical activity may play an important role in the management of AD.

Despite the benefits of physical activity, the rates of PA in individuals with AD are lower than their cognitively normal peers (A. Watts, Walters, Hoffman, & Templin, 2016; A. S. Watts, Vidoni, Loskutova, Johnson, & Burns, 2013). Common barriers to increasing PA in adults with cognitive impairment include: lack of transportation, poor memory, limited support from caregivers, lack of knowledge on how to exercise, lack of time, fear of injury, and limited resources (R. G. Logsdon, McCurry, Pike, & Teri, 2009). Interventions to overcome these barriers and promote PA in individuals with AD are limited. These trials generally require participants to travel to a medical clinic or community site for supervised exercise (Frederiksen, Sobol, Beyer, Hasselbalch, & Waldemar, 2014; Hoffmann et al., 2016; Morris et al., 2017; Pitkala et al., 2013; Yang et al., 2015; Yu et al., 2015), with a limited number of trials utilizing home visits by exercise specialists (Barnes et al., 2015; Cox et al., 2013; Lowery et al., 2014; Pitkala et al., 2013; Suttanon et al., 2013; Teri et al., 2003) and trained caregivers (Steinberg, Leoutsakos, Podewils, & Lyketsos, 2009; Vreugdenhil, Cannell, Davies, & Razay, 2012) to deliver exercise interventions. The significant barriers associated with these approaches, including the time and cost associated with travel to clinic or community site, expense associated with individual home visits and additional burden associated with caregiver directed exercise, greatly reduce the potential of these approaches to result in sustained improvements in MPA.

Additionally, caregivers of adults with AD may benefit from physical activity. Over 15 million people in the U.S. provide unpaid care for adults with AD or other dementias (Alzheimer's Association, 2017). Approximately 80% of adults with AD in the U.S. live in the community (Alzheimer's Association and National Alliance for Caregiving, 2017a); 66% of caregivers live with the care recipient (Kasper, Freedman, Spillman, & Wolff, 2015). More than 90% of those with AD living in the community rely on family or unpaid caregivers for their care (Kasper et al., 2015). Approximately 50% of these unpaid caregivers are in a high-burden situation (Alzheimer's Association and National Alliance for Caregiving, 2017b). High burden of care over an extended time frame places significant mental and physical strain on caregivers and may negatively impact caregiver health

(Alzheimer's Association and National Alliance for Caregiving, 2017b; Fonareva & Oken, 2014). Family caregivers of adults with AD have reduced health related quality of life (Andreakou, Papadopoulos, Panagiotakos, & Niakas, 2016; Garzon-Maldonado et al., 2017), are often socially isolated (Beeson, Horton-Deutsch, Farran, & Neundorfer, 2000; Brodaty & Donkin, 2009) and are at increased risk for depression and anxiety (Brodaty & Donkin, 2009; Sallim, Sayampanathan, Cuttilan, & Chun-Man Ho, 2015), musculoskeletal discomfort (Darragh et al., 2015), stroke (Haley, Roth, Howard, & Safford, 2010) and show elevated biomarkers for cardiovascular disease (Roepke et al., 2012; Von Kanel et al., 2012). Caregiving has also been associated with reduced physical activity (Burton, Newsom, Schulz, Hirsch, & German, 1997; Fredman, Bertrand, Martire, Hochberg, & Harris, 2006; Hirano, Suzuki, Kuzuya, Onishi, Hasegawa, et al., 2011; Queen, Butner, Berg, & Smith, 2017; Schulz et al., 1997). Data from a limited number of home-based physical activity interventions directed to family members providing care for adults with dementia have shown reduced stress, caregiver burden, depression, improved sleep quality and positive affect (Castro, Wilcox, O'Sullivan, Baumann, & King, 2002; Connell & Janevic, 2009; Farran, Etkin, et al., 2016; Farran, Paun, et al., 2016; Hirano, Suzuki, Kuzuya, Onishi, Ban, et al., 2011; Hirano, Umegaki, Suzuki, Hayashi, & Kuzuya, 2016; Teri et al., 2003). Thus, an intervention designed to increase MPA in both adults with AD and their caregiver may improve caregiver health and function as well as provide a role model for MPA for the adult with AD.

Previous studies have found physical activity interventions delivered via video conferencing to be feasible for promoting PA in individuals with disabilities (Ptomey, Willis, et al., 2017). An intervention to increase MPA, delivered via video conferencing to adults with AD and their caregivers in their homes, represents a potentially effective approach for increasing MPA in this group. This approach requires no travel commitment, since the need for transportation to a medical clinic or other community facility is eliminated, and offers the potential for peer support and socialization, which may be important for initiation and maintenance of MPA. However, feasibility of remotely delivered physical activity interventions in adults with AD is unknown.

The purpose of this pilot study was to evaluate the feasibility (adherence, retention, and safety) of the group video conference approach for increasing MPA in adults with AD and their caregivers and to estimate the effectiveness of the intervention on change in MPA. The criteria for measuring feasibility was set at the following: adherence was defined as mean attendance rates ≥ 70%, an average of ≥ 20 min/session (wks. 4–12), and ≥ 70% compliance with PA self-monitoring will be considered acceptable, retention was defined as attrition ≤ 30%, and safety was defined as ≤10% of participants reporting a serious adverse event.

METHODS

Overview.

Adults with AD and caregivers were asked to attend 30-minute at-home, group exercise sessions delivered by a trained health coach using video conferencing (Zoom Inc., San Jose, CA) on an iPad mini tablet computer (Apple Inc., Cupertino, CA) 3-days per week over 12-weeks. Duration and intensity of physical activity during group sessions was assessed using

Fitbit Charge HR (Fitbit Inc. San Francisco, CA) wireless activity tracker/heart rate monitor. Participants and caregivers also met with the health coach monthly via FaceTime® to receive support and education designed to assist with intervention compliance. The study protocol was approved by the Human Subjects Committee at the University of Kansas Medical Center.

Participants.

Men and women were recruited from December 2016 to the end of January 2017 from the patient population at the University of Kansas Medical Center. Study team members contacted patients who appeared to be eligible based on patient records by phone and invited them to participate in the study. Questions from interested patients and caregivers were addressed, and eligibility was assessed during the phone call. In-person appointments with interested participants and their caregiver were scheduled to explain the project in detail and answer questions. Informed written consent was obtained from all adults with AD and their caregivers. Inclusion/exclusion criteria for the adults with AD were: *Inclusion: 1)* Diagnosis of mild to moderate AD (CDR 0.5–2) assessed by a physician at the University of Kansas Alzheimer's Disease Center; *2)* Age: ≥ 50y; *3)* ability to participate in MPA (e.g. walk including with an assistive device) as verified by physician consent; *4)* reside in a supported living situation either at home or with a caregiver (i.e., adult child, spouse, or staff); *5)* Have a caregiver who is able to participate in MPA, as verified by physician consent, and who agrees to participate in the intervention; 6) wireless Internet access in the home. *Exclusion: 1)* Current participation in a regular exercise program, determined as greater than 500 kcal/wk. of planned activity as estimated by questionnaire (Taylor et al., 1978). Inclusion/exclusion criteria for the caregiver were: *Inclusion:1)* ≥18 yrs. *2.)* Spends at least 20 hrs./wk. with the adult with AD.*3)* PCP clearance to participate in MPA. *Exclusion: 1)* Unable to participate in MPA, i.e., brisk walking; *2)* Serious medical risk, such as cancer within the last 5 yrs. or cardiac event, i.e., heart attack, stroke, angioplasty within the last 2 yrs.

Technology overview.

All adult with AD/caregiver dyads were provided an iPad mini tablet computer (Apple Inc., Cupertino, CA) pre-loaded with both the video conferencing software (Zoom Video Conferencing Inc., San Jose, CA) and Fitbit applications, along with an iPad/HDMI adaptor that allowed the group video conference sessions to be displayed on a larger TV screen, if desired. Downloading of other applications or Internet browsing was restricted on all iPads. A Fitbit Charge HR (Fitbit Inc. San Francisco, CA) wireless monitor was provided to all adults with AD and their caregivers to be worn on the wrist for the duration of the 12-wk. study. The Fitbit tracks steps, heart rate, sedentary time, and time spent in light, moderate or vigorous PA. The validity and reliability of Fitbit assessments (steps) is acceptable (ICC = 0.86 and .07–1.0, respectively) (Evenson, Goto, & Furberg, 2015). Real-time data from the Fitbit were automatically transferred, via the web, to cloud storage (Fitabase) maintained by Small Steps Labs LLC (San Diego, CA). This data was accessible to health coaches to provide motivation and feedback during intervention and support sessions. Participants were asked to return the iPad and adaptor to the investigators at the completion of the study. However, as an incentive, participants and caregivers who completed the trial were allowed to keep the Fitbit Charge HR.

Intervention

Orientation.—Each adult AD/caregiver dyad attended an orientation session led by their health coach. In addition to outlining study requirements and distributing iPads, Fitbits, resistance bands etc., the health coach described and demonstrated the Zoom software, Fitbit and allowed time for practice and questions. Additionally, basic stretching exercises and the use of the resistance bands were demonstrated and practiced. Videos demonstrating basic use of the iPad, Fitbit, and Zoom software were created and uploaded onto the iPad tablet for viewing through the study.

Exercise Sessions.—Sessions of ~ 30 minutes duration, were delivered via video conferencing 3 times per week over 12 weeks to groups of 5–8 dyads each in their own home. Groups were formed based on mutual time availability and were generally conducted in the afternoon or early evening. Exercise sessions were led by a health coach who was a specialist in adapted exercise and experienced in working with adults with cognitive impairments. Participants, who could all be seen simultaneously on the video display, were encouraged to interact with other participants and the health coach. Sessions consisted of a warm-up (~ 5 minutes.), MPA, i.e., 3–6 METs, (~20 minutes.), and a cool down (~5 minutes.). Exercise sessions followed daily scripts designed by a specialist in adapted physical education and a physical therapist who specialized in working with older adults and adults with AD. The MPA included aerobic activity (e.g. walking/jogging standing in place or sitting in a chair, sit to stand, dance movements); resistance exercise (e.g.TheraBand-arm curls, leg extensions, side leg raises, and seated rows); and balance exercise (e.g. heel to toe walks, balance walk, and standing on one foot with/without support of a chair). No session was the same throughout the intervention. Caregivers were allowed to attend the exercise sessions alone, if the adult with AD they cared for was unable or unwilling to attend. Adults with AD could attend the sessions without the designated study caregiver, but they were required to have someone at their home who could supervise them during the exercises.

Education/support sessions.—Each adult/caregiver dyad was asked to attend 1 brief (15 minutes) joint education/support session over video chat with their health coach each month. The health coach provided feedback on the level of MPA achieved since the last session, as assessed by the Fitbit, and encouragement and suggestions for achieving the current MPA recommendation. In addition, exercise tips such as alternative activities for inclement weather, importance of hydration, especially for exercise in hot and humid conditions etc., were covered.

Feasibility.—The Consort 2010 Extension for Pilot and Feasibility guidelines states “a feasibility study asks whether a future trial can be done, should be done, and, if so, how ” (Eldridge et al., 2016). The purpose of this pilot study was to evaluate the feasibility (adherence, retention, and safety) of the group video conference approach for increasing MPA in adults with AD and their caregivers and to estimate the effectiveness of the intervention on change in MPA. Feasibility criteria was set a-priori and was based on our previous remotely delivered exercises interventions in individuals with cognitive impairments (Ptomey, Saunders, et al., 2017; Ptomey et al., 2018; Vidoni et al., 2016). The criteria for measuring feasibility was set at the following: adherence was defined as mean

attendance rates ≥ 70%, an average of ≥ 20 min/session (wks. 4–12), and ≥ 70% compliance with PA self-monitoring was considered acceptable, retention was defined as attrition ≤ 30%, and safety was defined as ≤10% of participants reporting a serious adverse event.

Assessments

All outcomes measures were collected from both adults with AD and their caregiver at **Blinded for Review**. Basic demographic information (e.g. age, race/ethnicity, sex, duration of AD) was obtained at baseline only. Baseline data was collected in February of 2017, and end of study data was collected in May of 2017. Attendance at group exercise and individual support/education sessions, and minutes of MPA during group sessions were measured across the 12-week study.

Attendance.—Attendance at both group exercise and individual support/education sessions was recorded by the health coach. Group exercise session attendance was defined as being logged in to the video conference and remaining on the screen for the entire 30-minute session. Attendance at individual support/education sessions was defined as answering the FaceTime® call and being present on screen for the entire session.

Minutes of MPA.—To assess both minutes of MPA achieved during the group exercise sessions, and changes in daily physical activity across the intervention, participants were asked to wear a Fitbit Charge HR on their non-dominant wrist daily across the 12-week intervention. The Fitbit estimates MET values based on both motion and heart rate data using a proprietary algorithm. Fitbit data was collected in 1-minutes epochs with a minimum of 8 hours (480 minutes) constituting a valid monitored day. Intensity of the activity was classified using standard MET values: sedentary time ≤ 1.0 METs, light intensity =1.1–2.9 METs, and moderate intensity =3.0–5.9 METs.

Quality of life.—Quality of Life for the adult with AD was assessed at baseline and 12 weeks using the QOL-AD(Rebecca G Logsdon, Gibbons, McCurry, & Teri, 1999), a brief, 13-item self-report (and 15-item caregiver-report) measure. The QOL-AD has shown acceptable validity and reliability when completed by adults with AD or a caregiver proxy (ICC= .76 and .92 respectively)(Rebecca G Logsdon et al., 1999). Quality of life for caregivers was assessed at baseline and 12 weeks using the SF-36(Ware Jr & Sherbourne, 1992) which has acceptable validity and reliability in the general population (ICC ranges from 76–.90 and .70–.92 across the 7 domains)(McHorney, Ware Jr, & Raczek, 1993).

End of Study Survey.—At the end of the 12-week intervention, adults with AD were asked to complete a 3-question, yes-no, survey to determine if they enjoyed the program, if they felt better after doing the exercises each week, and if they would be willing to do the program again. This survey was administered verbally by study staff at an in-person visit. Caregivers were asked to complete a 12-question Likert scale survey gathering information on how much they enjoyed the program, helping the person they care for with the program, using technology, and self-efficacy for exercise for themselves and the person they care for. This survey was administered during an in-person visit, but the caregiver was left alone to fill out the questionnaire.

Statistical Analysis

Baseline measures and demographic characteristics were summarized using means and standard deviations for continuous variables, and frequencies and percentages for categorical variables. Percentage of exercise and individual support sessions attended as well as average Fitbit wear time, exercise session MPA and weekly MPA were calculated for each participant over the 12-week intervention. Linear regression was used to explore impact of age, sex, and BMI on Fitbit wear time in both adults with AD and caregivers. Change in MVPA and quality of life across the 12-week intervention was not assessed in accordance with the CONSORT 2010 feasibility guidelines which states "a feasibility study is not a hypothesis testing study, and therefore, no inferential statistical test should be conducted" (Eldridge et al., 2016). All analyses were conducted using SAS version 9.4 (SAS Institute Inc., Cary, NC).

RESULTS

Participants/Retention/Safety.

Nine adults with AD/Caregiver dyads enrolled in the study, and 7 (78%) completed the 12-week intervention. The dyads who did not complete the intervention voluntarily withdrew. No participants reported an injury or other serious adverse event.

Adults with AD were ~74 years of age and 56% female, the caregivers were ~67 years of age and 67% female. Full demographics are found in Table 1.

Session attendance and MPA.

Adults with AD attended an average of 77.3 ± 42.0% of the group exercise sessions, and caregivers attended an average of 79.2 ± 40.3% of group exercise sessions. Adults with AD averaged 20.4 ± 8.5 minutes and caregivers averaged 27.0 ± 8.2 minutes of MPA per group exercise session.

Fitbit Use.

Adults with AD wore the Fitbit 82.5 ± 27.7% of total study days and caregivers wore the Fitbit 79.9 ± 25.7% of total study days. Age (p=.26), BMI (p=0.17), and sex (p=0,71) were not associated with Fitbit use.

Changes in Light and Moderate Physical Activity across Study (Table 2).

The start of intervention (average of weeks 1–3) MPA for adults with AD and caregivers was 53.9 ± 34.5 minutes/wk. and 166.4 ± 54.7 minutes/wk. respectively. Weekly MPA increased from the start (weeks 1–3) to end of the study (weeks 10–12). in both adults with AD (24 minutes/wk., 49%) and caregivers (49 minutes/wk., 30%). Additionally, light physical activity increased in both adults with AD (36.4 minutes/wk., 11%) and caregivers (11.6 minutes/wk, 3%).

Quality of Life.

Adults with AD self-reported quality of life was 37.6 ± 2.6 at baseline and 38.9 ± 4.8 at the end of 12-weeks. Caregiver reported quality of life for the adult with AD was 32.7±3.7 at baseline and 33.0±3.2 at the end of 12-weeks. Quality of life of caregivers for at both baseline and 12 months is presented in Table 3.

Exit Survey.

When asked about their experiences with the exercise intervention, 100% of adults with AD reported they enjoyed the program, felt better after doing the exercises, and would be willing to do the program again. One-hundred percent of caregivers reported they felt positively about the intervention as a whole, enjoyed the exercise sessions, enjoyed working out with other individuals, and enjoyed working out from home. Eighty-six percent of caregivers reported feeling confident about getting in exercise on their own, with 57% reporting an increase in confidence since the start of the program. The largest reported barrier to the study was the use of technology, with 28.6% of caregiver reporting it was hard to connect the iPad to the internet, and 14.3% reporting it was hard to connect the Fitbit to the iPad. However, all caregivers reported that it was easy or very easy navigate the iPad, and use the Zoom app.

DISCUSSION

Results of this pilot trial suggest that group video conferencing may be feasible for delivering physical activity to adults with AD and their caregivers. The intervention was well accepted with 77% of dyads completing the 12-week intervention. Adherence was acceptable as adults with AD and their caregivers attended 77% and 79% of group exercise sessions, achieving an average of 20 minutes and 27 minutes. of MPA per session. Additionally, the intervention was found to be safe, with no participants reporting an adverse event. Results also demonstrate that an intervention using group video conference to promote physical activity may increase weekly MPA, as adults with AD and caregivers increased their minutes of weekly MPA by 49% and 30% respectively.

There are limited trials that have evaluated remote strategies for the delivery of MPA in community dwelling adults/caregivers with which to compare our results. Dal Bello-Hass et al. conducted a small (n=2 patient/caregiver dyads), short-term (4 wk.) pilot trial in which dyads came into a telehealth site to do remote physical activity sessions twice a week. Attendance was 100% for the two participants and 87% for caregivers (Dal Bello-Haas, O'Connell, Morgan, & Crossley, 2014). Daily MPA was not collected. While the attendance was higher than what was observed in our study, the small sample size makes it hard to compare the results. Together, these studies demonstrate that remote PA is feasible in this population.

Attendance in our intervention was similar to other in-home PA programs, which typically include home visits by exercise specialists (Barnes et al., 2015; Cox et al., 2013; Lowery et al., 2014; Pitkala et al., 2013; Suttanon et al., 2013; Teri et al., 2003) or using trained caregivers to deliver the intervention (Steinberg et al., 2009; Vreugdenhil et al., 2012).

Additionally, attendance to our intervention was similar to community-based PA interventions (Frederiksen et al., 2014; Hoffmann et al., 2016; Morris et al., 2017; Pitkala et al., 2013; Yang et al., 2015; Yu et al., 2015) in adults with AD, but without the burdens of traveling to the exercise sites and cost-of gym membership.

Due to the feasibility nature of this study, the intervention was not powered to detect significant change across time in minutes of MVPA. However, adults with AD increased their MVPA by 49%, which represents a clinically significant improvement in MPA. In a recent review of over 80 trials, Chen et al (49) found that aerobic physical activity, specifically moderate intensity, has an inverse relationship with AD risk and progression. The review concluded that MPA has a positive effect on, cognitive performance, processing speed, episodic memory, procedural memory, cerebral blood flow, and posture, while potentially reducing depression symptoms and muscle atrophy. Additionally, these beneficial effects appear to have a dose-response relationship with MPA. Our pilot study resulted in a relatively large increase in MPA in a 12-week time period, thus longer-term (>6 months) interventions may result in greater increases in MPA and may result in significant improvements in AD risk and progression.

Few previous studies have measured changes in MPA across time in adults with AD, and in those that did, long-term changes in MPA were minimal. For example, Cox et al (Cox et al., 2013) conducted a 6-month home-based intervention (with a 12-month follow up) in individuals with mild cognitive impairments (n=170), in which participants got a single individual counseling session, weekly phone calls, and an exercise manual. Adherence to the prescribed PA was 72.8% (95% CI: 70.8, 74.9%). Weekly PA increased by 30% at 6 months, but there was only a 5% increase by 18 months. Vidoni et al (Vidoni et al., 2016) completed an 8-week trial in 21 adults with AD to increase their daily steps. At baseline participants were given recommendations to increase their activity and given a Fitbit to wear daily across the intervention, with the goal to double number of steps taken. However, participants did not change their weekly step count above Week 1 (p=0.21). While the changes in MPA from our trial study are greater than in previous interventions, a longer trial is needed to determine if compliance with our method is sustainable.

In the current trial, caregiver's baseline levels of minutes of MPA met the established PA guideline of 150 minutes a week (Piercy & Troiano, 2018), which is in contrast to what others have shown (Burton et al., 1997; Fredman et al., 2006; Hirano, Suzuki, Kuzuya, Onishi, Hasegawa, et al., 2011; Queen et al., 2017; Schulz et al., 1997). For example, in a 12-month trial, by Farran et al (Farran, Etkin, et al., 2016) comparing an Enhancing Physical Activity (EPA) intervention to a Caregiver Skill Building (CSB) intervention, baseline caregiver physical activity averaged 62 ± 119 minutes/wk and 79 ± 111 minutes/wk in the EPA and CSB groups, respectively. In our current trial, even though baseline levels of MPA were high caregivers were still able to increase their minutes of MPA by ~49 minutes a week, which is similar or greater than previous exercise interventions in this population. For example, at 12 months Farran et al (Farran, Etkin, et al., 2016) found an increase of 71 minutes (133 ± 167 minutes) in the EPA group and a decrease of 20 minutes (59 ± 88 minutes) in the CSB group. Connell et al (Connell & Janevic, 2009) established that, in the short-term, a telephone-based exercise intervention increased weekly exercise minutes for

caregivers, but by a 12-month follow-up a significant improvement was not seen (36). It should be noted that due to the high levels of MPA at the start of the intervention, the caregivers enrolled in this pilot study may not accurately reflect all caregivers in our target population, and thus our results may not be generalizable to the larger population.

Previous exercise trials in adults with AD have found improvements in quality of life. Teri et al (Teri et al., 2003), utilizing the Reducing Disability in Alzheimer Disease program (RDAD), found that at 3 months scores for physical role functioning and Cornell Depression Scale for Depression in Dementia improved significantly ($p<0.001$ and $p<0.02$ respectively). In a 4-month, community-based exercise program in adults with AD, Vreugdenhil et al (Vreugdenhil et al., 2012) found Mini Mental State Exam scores increased 2.6 points ($p<0.001$), Timed Up and Go test was performed 2.9 seconds faster ($p=0.004$), and Instrumental Activities of Daily Living Scores increased 1.6 ($p=0.007$). The current trial discovered a trend towards improvements in quality of life scores for both adults with AD and caregivers. A larger trial will be able to determine if these improvements are statistically significant across time.

Adequately powered trials are warranted to evaluate the long-term sustainability of group video approach, i.e. ≥ 6 months, the impact of group exercise sessions on total daily MPA and sedentary time, changes in quality of life, and to compare the effectiveness of the group video and on-site approaches for effectiveness and participant and provider costs. If the results of these trials are positive, community agencies providing services to adults with AD or their caregivers would have a viable low-cost option for promoting increased MPA among individuals that they serve. This technology-based approach may also allow agencies to provide MPA to individuals with AD living in areas that do not have access to gyms or other community programs as well as those who lack the resources to attend in-person exercise programs. However, this approach would require the purchase of devices to deliver the intervention. Additionally, as our exit surveys reported that some adults with AD had trouble with the use of technology and the internet, the use of technology may present barrier to some adults with AD.

The results of this study suggest that video conferencing may be a feasible approach for improving MPA in adults with AD and their caregivers, and that larger trials determining the efficacy of this approach are warranted. However, this study is limited by a small sample (n= 9) of mostly non-Hispanic white adults with AD/caregiver dyads, who were incentivized to participate in a short-term (12 week), non-randomized trial, and thus should be interpreted cautiously.

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Table 1.

Baseline characteristics of adults with Alzheimer's Disease and their Caregivers

	Adult with AD		Caregiver	
	N	**Mean+SD**	**N**	**Mean+SD**
Age (years)	9	74.1 ± 10.2	9	67 ± 13.0
Weight (kg)	9	82.7 ± 24.3	9	76.1 ± 1.0
Height (cm)	9	167.4 ± 11.7	9	168.7 ± 10.2
Waist Circumference (cm)	9	99.8 ± 18.8		
BMI ($kg \cdot m^2$)	9	29.0 ± 6.1	9	29.2 ± 8.0
Education level (%)				
High School Diploma/GED	4	44	3	33
Post Graduate Classes	5	56	6	67
Race (%)				
Black	1	11	1	11
White	8	89	8	89
Sex (%)				
Male	4	44	6	67
Female	5	56	3	33

Table 2.

Changes in Weekly Light and Moderate Physical Activity in Adults with AD and Caregivers across a 12-week Intervention.

	Adults with AD		Caregivers	
	Light Physical Activity (minutes/wk)	**Moderate Physical Activity (minutes/wk)**	**Light Physical Activity (minutes/wk)**	**Moderate Physical Activity (minutes/wk)**
Weeks 1–3	346.3 ± 116.6	48.63 ± 42.9	407.9 ± 106.0	163.94 ± 85.1
Weeks 4–6	378.0± 116.9	51.93 ± 25.7	427.3 ± 63.5	214.67 ± 74.8
Weeks 7–9	364.2 ± 123.6	69.6 ± 49.8	446.0 ± 88.9	203.3 ± 57.4
Weeks 10–12	382.7 ± 98.0	72.5 ± 41.5	419.5 ± 58.3	212.6 ± 82.3

Table 3.

Caregiver's Quality of Life at Baseline and 12-Weeks Measured Using the SF-36.

	Baseline	**12-weeks**
SF-36 Domain	***Mean ± SD***	***Mean ± SD***
Physical Functioning	77.1 ± 26.3	73.6 ± 20.2
Role Limitations due to Physical Health	53.6 ± 41.9	64.3 ± 40.5
Role Limitations due to Emotional Problems	66.7 ± 43.0	76.2 ± 39.1
Energy/Fatigue	56.7 ± 19.7	57.5 ± 21.2
Emotional Well-Being	78.0 ± 15.5	71.2 ± 18.8
Social Functioning	78.6 ± 20.0	80.4 ± 14.2
Pain	67.5 ± 24.8	67.9 ± 14.9
General Health	64.3 ± 18.4	70.8 ± 9.8