Regular Research Article

One Year Impact on Social Connectedness for Homebound Older Adults: Randomized Controlled Trial of Tele-delivered Behavioral Activation Versus Tele-delivered Friendly Visits

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ABSTRACT

Objectives: Lonely and socially isolated homebound older participants of a randomized trial comparing behavioral activation (BA) versus friendly visiting, both delivered by lay counselors using tele-videoconferencing, were reassessed at 1-year to determine whether benefits at 12 weeks were maintained over time. *Methods:* The study reinterviewed 64/89 (71.9%) participants. *Results:* The positive 12-week impact of tailored BA on 3 indicators of social connectedness (loneliness, social interaction and satisfactions with social support) was maintained, albeit to a lesser degree, over 1 year. The positive impact on depressive symptoms and disability was also maintained. *Conclusions:* The intervention's potential reach and scalability are suggested by several factors: participants were recruited by home delivered meals programs during routine assessments; the intervention was brief and delivered by lay counselors; care delivery by tele-videoconferencing is increasingly common. The 1 year outcomes indicate that brief BA delivered by tele-video conferencing can have an enduring impact on social connectedness. (Am J Geriatr Psychiatry 2021; 29:771−776)

Highlights

- **What is the primary question addressed by this study?** Does brief behavioral activation tailored for social connectedness and delivered using televideo-conferencing (Tele-BA) by lay counselors for homebound older adults have an enduring impact at one-year follow-up?
- **What is the main finding of this study?** Tele-BA's positive impact on three indicators of social connectedness (loneliness, social interaction and satisfactions with social support), depression, and disability was maintained, albeit to a lesser degree, at 12-month follow-up.
- **What is the meaning of the finding?** Lay-counselor and tele-delivered BA can be an effective intervention to increase social connectedness in isolated and lonely homebound older adults.

OBJECTIVES

The COVID-19 pandemic has thrown the risk and sequalae of social isolation and loneliness in homebound older adults into stark relief. The pandemic, with its "stay-at-home" orders, further isolated older adults who were already homebound for functional/medical reasons.

We previously reported that brief (5-session), tailored behavioral activation (BA) delivered by lay counselors using tele-videoconferencing was a feasible and effective strategy to reduce loneliness and social isolation in homebound older adults at 6 and 12 week follow-up.[1] While the sample purposely excluded individuals with moderate to severe depression, the intervention also reduced mild depressive symptoms. The intervention was compared to friendly visiting, similarly delivered.

As BA is designed to help participants develop enduring skills, we questioned whether the positive impact of the intervention (*tele-BA*) on social connectedness would persist beyond 12 weeks. This report explores the duration of the intervention's effect using 12-month follow-up interviews of study participants.

METHODS

Participants and setting

Participants were home-delivered meal (HDM) clients aged ≥50 years in urban Texas or rural New Hampshire who reported loneliness (UCLA Loneliness Scale[2] ≥ 6) to case managers during their annual HDM assessment, gave oral consent for study referral, met formal study criteria when assessed by research staff and provided written IRB-approved informed consent. Exclusion criteria included moderate-severe depressive symptoms (Patient Health Questionnaire [PHQ]-9[3] score ≥10), probable dementia (Blessed Orientation, Memory, and Concentration[4] [BOMC] >9), self-reported substance abuse, and active suicidal ideation.

Of 278 referrals, 89 individuals met criteria and were randomized into two RCT arms each receiving 5, 1-hour weekly tele- video sessions of: (1) *Tele-BA* (n = 43); and (2) *Tele-FV*: (n = 46). Study staff provided and/or helped participants set up the videoconferencing equipment. Participants completed baseline, 6-week and 12-week follow-up assessment; for this report, we attempted to recontact all baseline participants for 1-year follow-up.

Intervention: Tele-BA as Treatment Condition and Tele-FV as Active Control

BA is a brief, structured behavioral approach that aims to increase and reinforce healthy behavior (e.g., engaging in meaningful activities aligned with personal values and beliefs) and to decrease depressive behavior (e.g., staying in bed all day). As described elsewhere,[5] we adapted BA to increase and reinforce social connectedness through coaching and collaborating with participants on strategies to engage in rewarding activities and mitigate barriers to those activities.

Friendly visiting (FV) is a common strategy to provide social contact to isolated older adults. Our *Tele-FV* sessions mirrored traditional FV sessions by engaging participants in conversation and

giving support without direct coaching of coping skill development.

Measures

Social connectedness was assessed by three indicators: loneliness (PROMIS Social Isolation Scale[6]; SIC); social interaction (Duke Social Support Index[7] [DSSI] subscale) and perceived social support (DSSI subscale). Secondary outcomes included depressive symptoms (PHQ-9) and disability (12-item WHO Disability Assessment Schedule;[8] WHODAS). At baseline, *Tele-BA* and *Tele-FV* participants did not differ on sociodemographic characteristics or study outcomes.

Analysis

Treatment effects for the SIC, DSSI subscales, PHQ-9, and WHODAS were analyzed in an identical manner. All models were fit using mixed-effects regression models implemented using the lmer function from the lme4 and lmerTest packages using R version 4.0.3 in RStudio 1.4.1103. Mixed models make use of all complete observations. In this study, each observation represents an individual time point. Participants are included if they have data from one or more time points, thus representing the intent-to-treat (ITT) principle in longitudinal data.[9] The models were estimated using maximum likelihood under the missing at random assumption. Participants were a random variable on which random intercept were estimated (i.e., time points were nested within participant). Models included the pretreatment assessment of the outcome as a covariate and follow-up assessments at 6-, 12-, and 52-weeks were included as outcomes. We assessed four models: (1) an unconditional time (i.e., no time variables), containing only the mean-centered baseline assessment of the outcome, (2) a linear time model, (3) a quadratic time model, and (4) a natural log time model. The four unconditional growth models were compared using the Akaike information criterion (AIC) to determine which model was the best fit to the data. A model whose AIC was lower by 2 or greater than a comparison model was a substantially better model.[10]

After the unconditional growth model was established, a dummy variable representing the treatment effect (i.e., 1 if Tele-BA; 0 if Tele-FV) was added to the model. Estimated marginal means for both conditions were computed from the final models and pairwise differences between these values were estimated (i.e., Tele-BA v. Tele-FV) to obtain model-predicted mean differences. The group differences between the estimated marginal means were divided by the pooled standard deviation of the baseline assessment of the outcome to obtain a standardized effect size ($d_{GMA-raw}$) that is equivalent to traditional standardized mean difference effect sizes (e.g., Cohen's *d*).

In the first step of establishing the unconditional growth models prior to modeling treatment effects, models with the baseline measure of the outcome as a covariate differed significantly from unconditional means models for each outcome; thus, the baseline measure of the outcome was included in all subsequent models. Next, comparisons of the unconditional growth model with the baseline covariate were compared with three additional unconditional growth models: linear, quadratic, and the natural log. Deviance tests indicated that there were no differences between the unconditional model and the unconditional linear, quadratic, or log models for any of the outcomes, indicating that there was no evidence that models of change across time were a better fit than the unconditional means models which indicates that the outcomes were stable across all three follow-up assessments.

RESULTS

Participant Characteristics

The study successfully reinterviewed 71.9% (64/89) of the original participants at one year; reinterviewed participants did not vary significantly from noninterviewed by study group (*Tele-BA* versus *Tele-FV*), study site (New Hampshire versus Texas), sociodemographic variables, or baseline social connectedness scores. Sample characteristics were: 61.8% female, mean age = 73.9 years, varied race/ethnicity (61.8% white, 18.0% black, 14.6% Hispanic), 68.2% lived alone, 61.3% incomes <$20,000/year, residents averaged >60 miles from study site and reported, on average, low social connectedness on all indicators. These factors did not vary at baseline by treatment group.

FIGURE 1. Mean scores over time: Loneliness assessed by PROMIS-L: (range 8−40, higher scores indicate greater perceived loneliness); Social Interaction assessed by Duke Social Support Index Social Interaction Subscale (range 4−12, higher scores indicate more social interaction and less isolation); Mixed effect models over 12 months demonstrated that, Tele-BA participants, compared to Tele-FV, reported lower levels of loneliness (t [81] = −3.05, p = 0.003) and higher social interaction (t [82] = 2.26, p = 0.026).
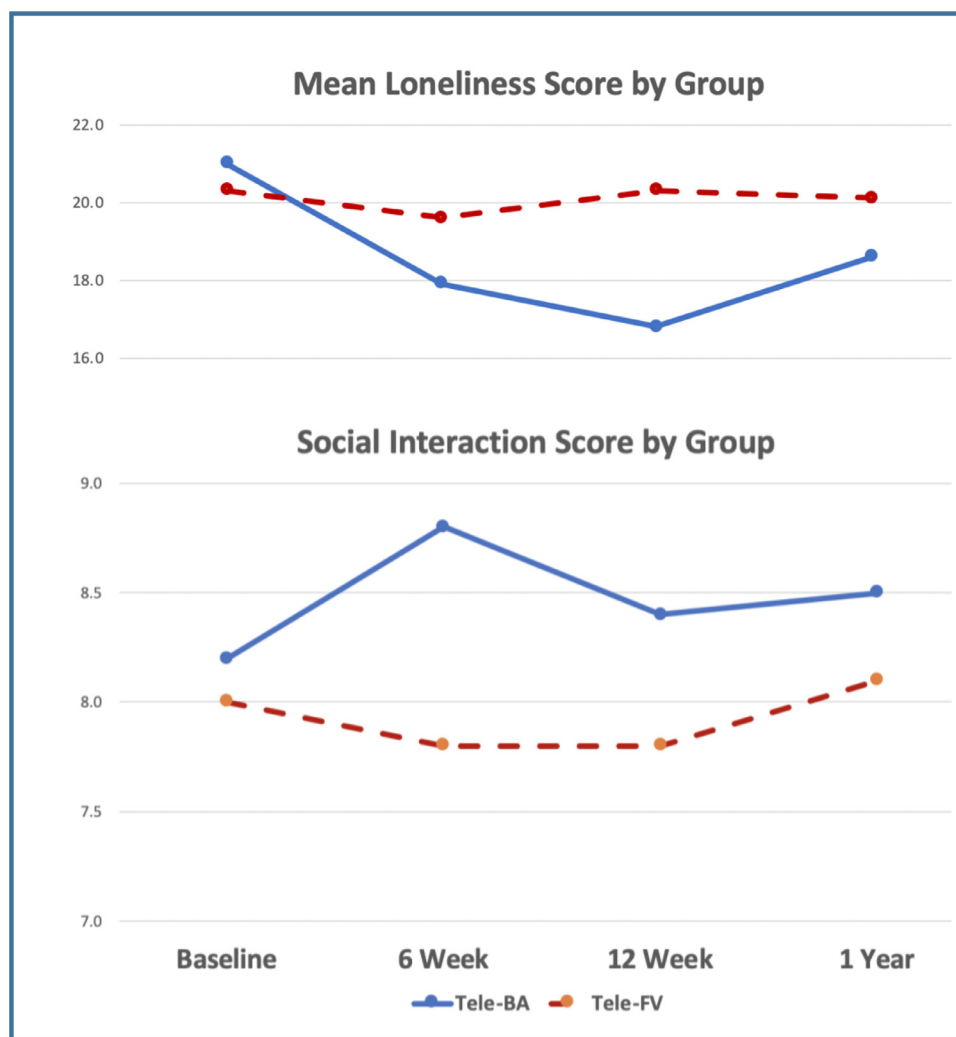
Treatment Effects of Tele-BA versus Tele-FV

At one year, *Tele-BA* participants, compared to *Tele-FV*, reported higher social interaction (t [82] = 2.26, p = 0.026; $d_{GMA-raw}$ = 0.32) and satisfaction with social support (t [83] = 2.31, p = 0.023; $d_{GMA-raw}$ = 0.29) and lower levels of loneliness (t [81] = −3.05, p = 0.003; $d_{GMA-raw}$ = −0.35), depression (t [82] = −3.47, p = 0.001; $d_{GMA-raw}$ = −0.59), and disability (t [83] = −2.90, p = 0.005; $d_{GMA-raw}$ = −0.40). As seen in Figure 1 for loneliness and social isolation, the relative greater improvement in all indicators of social

connectedness for *Tele-BA* participants diminished over the course of the year but scores remained better compared to baseline and to *Tele-FV*. The same patterns were found for depressive symptoms. Disability scores continued to decline for *Tele-BA* participants, but not *Tele-FV* over the year.

CONCLUSIONS

The principal finding of this brief report is that the previously described positive 12-week impact

of behavioral activation, tailored to address social connectedness, on homebound older adults was maintained, albeit to a lesser degree, over one year. This positive impact was observed for three indicators of social connectedness (loneliness, social interaction and satisfactions with social support) as well as depressive symptoms and disability. Both BA and the comparison arm (friendly visiting; FV) were delivered by lay counselors using tele-video technology, suggesting their potential scalability.

Strengths of the study include the collaboration with aging services agencies that serve homebound older adults; their capacity to identify and recruit clients who might benefit from the intervention extended the reach and potential scalability of the intervention. Our use of lay counselors also suggests that aging services agencies may be well positioned to provide *tele-BA* themselves. The success in conducting follow-up interviews of 72% of the original sample suggests that participants were satisfied with the experience. The interventions' brevity (5 sessions) also helps their scalability.

An implication of the findings is that while the impact of *tele-BA* was positive, it also declined somewhat beyond the 6 and 12-week follow-up assessments suggesting that booster sessions may further strengthen or maintain its effect. Limitations are the lack of information about clients who may have met study criteria but did not agree to study referral (possibly refusing the intervention and/or research participation), lack of geographic generalizability, and exclusion of people with moderate depressive symptoms who might also benefit from the intervention.

When we started the study, use of tele-video to deliver interventions with homebound older adults had some research evidence but was less common in real-world practice. The COVID-19 pandemic exacerbated the problem of loneliness and isolation, but also hastened the use of tele-video to deliver mental health interventions remotely. These trends coupled with the study findings indicate that using technology to deliver interventions is not only feasible and acceptable but can be used effectively to increase social connectedness in isolated and lonely homebound older adults. Based on these one-year outcomes, *Tele-BA*'s focus on skill development suggests that such interventions may have an enduring impact.

APPROVALS

The study was approved by the Institutional Review Boards of Dartmouth College/Dartmouth-Hitchcock, and University of Texas at Austin; ClinicalTrials.gov Identifier: NCT04131790

AUTHOR CONTRIBUTIONS

Each of the authors made a substantial contribution to the study conception (Bruce, Choi, Pepin), design (Bruce, Choi, Pepin, Marti), data acquisition (Bruce, Choi, Pepin, Stevens), and/or data analysis (Marti); all authors made a significant contribution to the interpretation of data and to drafting and revising the work critically for important intellectual content. All authors gave final approval of the version to be published and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

DISCLOSURE

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