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Anjali Shah March 23, 2020

Health Education for Diverse Older Adults: Cognitive and Psychosocial Effects of Remote vs. In-Person Delivery Methods

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An abstract of
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Abstract

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Significance: Educational seminars related to healthy-aging research may improve health literacy, cognition and psychosocial health in older adults. There is a need to better understand differences between remote and in-person delivery methods. The *DREAMS* program included and compared in-person and remote learning groups.

Objective: To evaluate the *DREAMS* program, a health and wellness series, by evaluating feasibility, satisfaction, adherence, and comparing attrition of a remote versus in-person program.

Participants: 130 diverse, older adults (*M* age: 70.89 ± 9.27 years; In-person n=95; Remote, n=35) enrolled. Data from 115 completers (In-person n=80; Remote n=35) were analyzed for performance outcomes.

Measures: Benchmarks for feasibility, adherence, and satisfaction were evaluated. Participants were tested at baseline, immediately post-intervention, and 8 weeks post-intervention. Adjusting for baseline performance, outcomes on cognitive, motor cognitive, health literacy, and psychosocial measures were compared between in-person and remote groups after intervention (at post-test and at eight-week follow-up) using adjusted mean differences (β coefficients).

Results: Fifteen individuals from the in-person program withdrew before completing six modules. All remote participants completed at least six of eight modules. Both programs had high satisfaction and feasibility. Post participation, compared to in-person participants, remote participants had significantly better global cognition (MoCA (p=0.015)), task switching (TMT B (p=<.001), TMT B-A (p=0.003)), less inhibition/switching errors (CWIT Inhibition/Switching scaled error score (p=0.045)), visuospatial cognition consistency and function (Reverse Corsi Blocks correct trials (p=0.012) and product score (p=0.033)), mental tracking capacity (Serial 3 Subtractions (p=<.001)), and better whole body spatial cognition (BPST completed trials (p=<.001), span (p=<.001), product score (p=<.001)). Compared to the remote group, the in-person group was significantly better with planning/organization (ToL mean first move time scaled (p=0.023)), visuospatial processing (TMT A (p<.001)), processing speed of word reading (CWIT Word Reading (p=0.042)) and inhibition/switching (CWIT Inhibition/Switching (p=0.044)), faster motor cognition (TUG-COG (p=0.026)), lower depression (BDI-II (p=0.002); GDS (p =0.02)) and higher mental quality-of-life (SF-12 MCS (p=0.008)).

Conclusion: This work links knowledge acquisition from in-person group learning and remote solo coaching methods to health wellness and performance. Future studies will remove barriers found in the study to reduce health disparities in diverse, older adults.

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Introduction

Patient empowerment in healthcare demands measurable and reproducible approaches that address health disparities for older, diverse, and underserved adults. This idea is vital given that life expectancy increased by thirty years during the 20th century in developed countries (Christensen et al. 2009). The older population is also becoming increasingly racially and ethnically diverse (Silverstein and Giarrusso 2010). Unfortunately, many low-income and minority older adults reside in public housing and disadvantaged communities, experience high stress related to poverty (Williams et al. 2010), and cope with multiple morbidities (Steinman et al. 2012). Older, low-income and racial/ethnic minority urban adults experience significant health disparities related to poverty and low health literacy (Kuczmarski et al. 2016), which create barriers to engaging these individuals in clinical research and healthcare (Kaiser, Thomas, and Bowers 2017). Also, minority and low socio-economic status (SES) groups of older adults are historically among the least represented in research (Davis et al. 2019). Disadvantaged aging populations are more susceptible to age-related decline and disease at earlier ages than more affluent counterparts (Steptoe and Zaninotto 2020). Engagement of the clinical research community with diverse older adults is necessary to increase study recruitment and address health disparities in research and clinical settings.

Older adults are encouraged to learn general health topics to enhance awareness of common concepts studied in clinical settings, increase engagement and research participation, and improve their overall well-being (Willis et al. 2006). In-person advocacy-based training and educational programs can enhance health literacy, cognition, and quality of life. However, lack of mobility and transportation are substantial barriers to group, in-person education. E-health and telemonitoring for education-based interventions are increasingly popular, and in 2020, the

COVID-19 pandemic highlighted the need for more telehealth options. Remote educational methods can adhere to social distancing guidelines and may have similar effects to in-person versions of the same intervention (Patel et al. 2021; Meij and Meij 2016; Inglis et al. 2015). To increase access to effective programs, tele-monitoring or telehealth approaches to rehabilitation are increasingly employed throughout the nation (Shigekawa et al. 2018). While in-person interventions emphasize didactic presentations and group interaction, telemonitoring prioritizes individual study, one-on-one accountability and perhaps deeper relationships between the monitor and the participant. Telehealth approaches are reproducible and can be tailored to the needs of a particular population to address health disparities for underserved older adults.

Telehealth approaches may also have downstream effects that could galvanize research participation. For example, "senior university"-style online seminars are programs offered nationwide to provide education for older adults; however, individuals with lower SES may have limited access to technological resources required for participation (Hansen and Reich 2015). Additionally, computerized alternatives could enhance cognition (Realdon et al. 2016), but they may not keep participants engaged in a personalized manner (Stine-Morrow et al. 2014).Web-based technology programs (e.g., Zoom, Google Meet, etc.) are also prone to technical failure and may be inaccessible to underserved individuals (Archibald et al. 2019). Utilizing such programs also requires users to have a higher degree of technological proficiency – including the ability to successfully log in and connect to a wireless network – which may not be prevalent among older adults (McCoy 2010; Boot et al. 2015). Therefore, a "low-tech" health education model may act as a more effective learning method compared to web-based technology alternatives. Active learning via "low-tech" tools, such as hard-copy expository and educational reading materials organized in a binder, may avoid technical difficulties, low accessibility, and

knowledge gaps in technological proficiency – barriers associated with web-based program utilization (Vaportzis, Clausen, and Gow 2017; Campana and Agarwal 2019).

In 2014-2016, the DREAMS program (*Developing a Research Participation Enhancement and Advocacy Training Program for Diverse Seniors*) was developed to be an educational framework designed to increase overall interest in clinical research, particularly among diverse seniors. DREAMS is an eight-week health education seminar co-taught by medical students and professional researchers (Hart et al. 2017). Patient stakeholder advisers (PSAs) from the community were involved throughout the project, and pre-intervention focus groups were held with older adults of low to high SES to tailor the program to reach underserved communities (Perkins et al. 2019). Originally designed as an in-person group learning program, the DREAMS curriculum was soon adapted to a remote, home-based educational intervention that used hard copy binders and telephone support to increase reach and to compare the two programs to learn more about group versus remote and individual dynamics, and to investigate the feasibility of a remote, "low-tech" version of DREAMS.

As such, this study compared two relatively "low-tech" programs: In-person and Remote DREAMS. Older adults in the in-person group seminar experienced interactive lectures and group discussions about health information and clinical research, while participants in the remote program read lessons independently and received weekly calls from the research team to engage in conversation and process that week's material.

Purpose of Study

The purpose of this study is to 1) compare the feasibility, adherence and satisfaction of the remote program versus the in-person program; 2) compare the efficacy of the remote program versus the in-person learning model for measures of executive and

visuospatial function, health literacy, and psychosocial determinants (depression, quality of life (QOL), and spatial extent of typical lifestyle); and 3) compare performance in cognitive, motor cognitive, health literacy, and psychosocial outcomes for in-person and remote participants after intervention (an immediate post-test and an 8-week follow-up).

Hypothesis

We expected to observe similar levels of feasibility and satisfaction ratings in both programs and expected the remote program to have a lower attrition rate due to increased accessibility of the model. We hypothesized that compared to the participants in the DREAMS remote program, participants in the in-person program would exhibit greater cognitive, motor cognitive, health literacy, and psychosocial function after the intervention.

Our rationale is based off the *Learning Theory* which states that discussing educational concepts with others and drawing connections between new and familiar learned material may enhance information retention and mental vitality (Mukhalalati and Taylor 2019). The theory also describes strategies that may influence a greater understanding of the educational material among participants and includes the following: allowing learners to reflect on past experiences, encouraging participation in discussions about the material, and having participants present questions to their peers to receive feedback and responses (Morgan, Whorton, and Gunsalus 2000). By undergoing an intellectual learning task, older adults may also improve brain function, measured by cognitive and psychosocial outcomes, as health education for older adults promotes healthier behaviors (Taylor et al. 2006; Ukoli et al. 2013; Zhou et al. 2018), improves cognition (Crocker et al. 2013; Smith et al. 2013) and performance of activities of daily living (ADLs) (Willis et al. 2006).

Therefore, if undergoing a lecture format with presenters and having small group discussions with peers is related to improved performance outcomes, the in-person program would be more effective. If enhanced performance is associated with independent learning from a take-home binder and having a 1:1 phone discussion about the health education concepts weekly, the remote group would be more effective.

Comparing the DREAMS in-person and remote programs isolates how learning via group interactions influences the efficacy of health education models, as experienced through the in-person model. Also, learning more about the remote program's effects is important because the remote program may increase accessibility and reach underserved and distant individuals in the community who will benefit from health education and discussions with research staff.

Methods

The protocol was reviewed and approved by Emory University Institutional Review Board; all participants provided informed consent prior to study activities. The trial was conducted with the insight, support, and involvement of Patient Stakeholder Advisers, two older adults representative of patient groups who were trained in research methods. These individuals contributed to decisions about each step of the research process (e.g., the consent process, serving as observers in the focus groups, communicating with participants as mentors) and are contributing to publications. The study was conducted from 2015-2017 and before the COVID-19 pandemic of 2020.

Participants

Adults ages 55 years and older from the Atlanta metro area were recruited through presentations at local community partner organizations, flyers in diverse senior living facilities, and word of mouth. Partner organizations included the following: senior living communities at high, moderate, and low-income levels; a volunteer organization associated with an Emory community service-learning program (Halpin et al. 2017); and an older adult education organization (Dillard et al. 2018). Interested potential participants were contacted by phone to schedule initial assessments. Those who enrolled were sequentially assigned to an 8-week program of either in-person or remote education. 130 participants were included, with 95 in-person and 35 remote health education participants.

The remote education program was developed to reach more underserved and distant individuals to increase accessibility. The remote program was included in the DREAMS program to deliver weekly modules through a telemonitoring format. Given the strong effects peer interaction has on efficacy of health education learning models, the need to control for peer

interaction was recognized, and so a weekly phone call between study staff and remote participants was included. The resources for the remote group were limited, e.g., staff to make calls to individual participants and the take-home binders with lesson plans. Therefore, a convenient sample of 35 individuals were assigned to the remote program.

DREAMS Program Description

The DREAMS program incorporated Community Based Participatory Research (CBPR) strategies, as study team members utilized vital information from patient stakeholder feedback and focus groups to build course content and target concerns, desires, biases, and questions of older adults in the metro-Atlanta area. The DREAMS curriculum was planned with participatory elements embedded throughout.

DREAMS Class (In-Person)

Part I of DREAMS was informed by themes gathered from focus groups conducted with older adults that identified important barriers to participation in research. With our DREAMS model, we were able to address these barriers and needs that were specific to our target population (Perkins et al. 2019). The DREAMS in-person sessions were co-taught by local investigators and medical students. Participants met once per week over eight consecutive weeks for 90 minutes, with approximately 60 minutes of interactive lecture followed by 30 minutes of small group discussion. The first class was an introductory general research-focused lesson, entitled, “Research and Creativity in Later Life." Other class topics concerned speakers’ areas of expertise, related to health and wellbeing (Table 2) (Dillard et al. 2018). To supplement full-class discussion during lectures and encourage active participation and social interaction from every participant, the 30-minute small group discussions were facilitated by DREAMS staff and student volunteers using the following prompts:

1. What did you learn today?
2. Did anything stand out or strike you as particularly interesting, novel, new?
3. What did you know about (topic) before you came here today?
4. How will you use this information to improve or change your life?
5. What would you tell your peer group about today's lecture? i.e., what do you see as the most important thing to share with your peers?

Learning Theory

Several learning theory concepts were briefly introduced during the first module/meeting to inform participants about the concepts underlying the DREAMS pedagogy. Discussing newly learned material and drawing connections between new and familiar topics can facilitate information retention. Therefore, during the 30 minute small group/partnered sessions, participants were asked to: 1) summarize the information learned with a partner in their own words, which was aided by the moderators who encouraged verbal recollection with the goal of teasing out the given presentation's major points (Craik and Tulving 1975; DeWinstanley and Bjork 2004; Hunt and McDaniel 1993); 2) discuss what participants found novel or distinctive about each topic, identify the information that was prior knowledge, and relate how the new information adds to their prior knowledge. This step was needed because a learner who actively uses prior knowledge in comprehension is more likely to incorporate new information into their long-term memory store, i.e., their 'knowledge' (Medin and Ross 2001); 3) generate three or more questions about the information; and 4) present the information and questions for the lecturer to the larger group in order to exchange information and receive feedback and responses. To guide the small group discussion, the questions were asked by moderators (See Questions for Part 1 listed above).

Remote DREAMS

A take-home binder was designed based on some of the presentations given during the in-person course and used in the remote intervention with telephone support. Telephone follow-up from members of the DREAMS study staff, the same moderators leading the in-person small group discussions, was intended to verify compliance, maintain motivation, and increase information retention through engaged discussion. The binder contained eight weeks of lesson plans, and participants were directed to complete one lesson (estimated time to complete: 1.5 h) per week. Lesson topics included:

- Week 1 – Research
- Week 2 – Creativity
- Week 3 – Exercise
- Week 4 – Nutrition
- Week 5 – Infectious Disease
- Week 6 – Family Caregiving
- Week 7 – Kidney Disease
- Week 8 – Health Disparities

Each lesson included 20-30 pages (14-point font) of accessible, eighth grade reading level material, as well as related supplemental web-based resources such as videos to watch. Use of online resources and videos was made an optional portion of remote program to accommodate challenges with computer and technology access common among our older adult participants, which was more prevalent pre-COVID19-pandemic when this study was conducted (Garfin 2020). Participants received weekly phone calls to ascertain progress and discuss each completed

lesson. The following questions confirmed active participation and prompted conversation during these phone calls:

1. Have you read the Week <1,2,3, etc.> lesson?
2. Did you also watch the videos?
3. Did you look at any of the websites/extra materials?
4. What did you learn? Did anything stick out as particularly interesting or new information for you?
5. What did you know about (topic) before reading this lesson?
6. Did you learn anything that you can use in your own life?

Measures

Participants completed demographic and health characteristics surveys prior to the study. They participated in three assessments: pre-intervention, post-intervention, and an eight-week post intervention follow-up. All study measures were administered in invariant order during assessments. Participants were given breaks *ad libitum* as well as snacks and water during all testing. Testing lasted 2-3 hours depending on the number of breaks the participants required and time to complete the tasks. All assessors were blinded to group assignment.

Feasibility

Feasibility for both programs was measured in terms of accomplishing experimental set-up and programmatic objectives and methods. Feasibility measures for the in-person program included the ability to: recruit speakers; find a location for the in-person intervention to take place; include participants without their own transportation; coordinate a specific time for participants to engage in the lectures; consider hearing and visual impairments that may have limited participant engagement with the educational material; communicate effectively between

speakers (faculty members and medical students) and moderators prior to each week's lecture; and ensure that moderators in the small discussion groups understood and confirmed that all participant voices and thoughts were included in the conversation.

For the remote program, feasibility measures involved: creating educational binders, which included determining health related topics with broad appeal; converting PowerPoint presentations from the in-person program into prose and manual format; performing approximately 280 instructional calls over 8 weeks to motivate and keep participants engaged (this estimate does not count the repeat calls that were necessary when contact was not made); and providing supplemental videos and informational websites to increase participants' understandings on the lesson topics.

Adherence

Completion of the program was considered to be attending/participating in at least 6 out of 8 modules. From this status, attrition levels were determined. To ascertain progress and maintain adherence to the program, in-person participants were called if they missed lessons and were encouraged to return. Additionally, obstacles that prevented participants from physically reaching the program site were troubleshooted by providing transportation services to those who were underserved. Weekly telephone calls to remote participants consisted of similar questions to confirm active participation and adherence to the program.

Satisfaction

An exit survey was administered (at immediate post-test only) to evaluate participants' views and satisfaction with the programs based on a 5-point Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree). The survey also included four open-ended questions to capture qualitative feedback to help with future program improvement.

Respondents indicated their favorite and least favorite topics, suggested future topics, and provided comments and suggestions. Qualitative data from open-ended responses were analyzed to identify themes related to satisfaction with the program (Hackney et al. 2015).

Cognition

The cognitive battery included standard, valid and reliable measures of global cognition, executive function, spatial memory**,** and mental tracking capacity (See Appendix A for assessment sheets).

The Montreal Cognitive Assessment (MoCA) is a thirty-question test that measures global cognition and screens individuals for mild cognitive impairment and assesses the cognitive domains of attention and concentration, executive functions, memory, language, visuo-constructional skills, conceptual thinking, calculations, and orientation. The total possible score is 30 points with a score of 26 or above considered normal cognitive function (Nasreddine et al. 2005).

The Tower of London (ToL) assesses planning ability as a part of executive function. An administrator presents a card with a certain arrangement and participants move three rings of differing sizes to three pegs to match the arrangement. The scaled total achievement score, time per move ratio, and mean first move time (an indication of planning time prior to task completion) were considered for analysis (Rainville et al. 2012).

The *Trails Making Test (TMT)* acts as an indicator of cognitive processing speed and executive functioning**.** TMT B-A isolates the construct of task switching (Sánchez-Cubillo et al. 2009), which has been found to have a strong relationship with performance-based measures of instrumental activities of daily living (IADLs). Completion time for TMT A, B, and B-A were analyzed (Reitan 1958).

The Delis–Kaplan Executive Function System (D-KEFS; Delis, Kaplan, and Kramer 2001) *Color-Word Interference Test (CWIT)* assesses response inhibition and task switching. This test consists of four parts: color naming (condition 1), word reading (condition 2), inhibition (Stroop task; condition 3), and inhibition/switching (condition 4). In the fourth condition, participants are presented with a list of words naming colors that are printed in different colored ink. Participants must shift between color naming and word reading depending on whether the word is listed in a box. Completion time scores and total error scores were converted into scaled values based on age group norms and published guidelines (Delis, Kaplan, and Kramer 2001; Lippa and Davis 2010).

Reverse Corsi Blocks Visuospatial Task is a test of visuospatial function and working memory which requires participants to watch the examiner point to a series of blocks on a tray, and then repeat the pattern backwards. The examiner begins with two moves, and progresses to a maximum of nine moves, with two trials per level. Participants are given one practice trial of two moves. Each level consists of two trials with the same number of moves. At each subsequent level, the number of required moves increases by one move. A participant advances to the next level if he or she successfully completes at least one of the trials in a level. Once a participant incorrectly performs both trials in a level, the task is concluded. The number of trials successfully completed, block span (length of sequence of moves participant is able to correctly perform), and product score were considered for analyses (Kessels et al. 2008).

Serial 3 Subtractions assesses mental tracking capacity, as administers request for the examinee to subtract by three from 100. Each subtraction is considered a unit and the calculations are made on the basis of 14 possible correct subtractions. The correct percentage of serial 3 subtractions was analyzed (Bristow et al. 2016).

Motor Cognition

Motor cognition measures evaluated motor and cognitive integration (See Appendix A).

Body Position Spatial Task (BPST) modeled after the Corsi Blocks task (Kessels et al. 2008) measures whole-body spatial cognition. The examiner demonstrates (verbally and visually) a sequenced pattern of steps to the side, forward, and turning (in place) and the participant repeats the pattern exactly. The examiner begins with two moves and progresses to a maximum of nine moves and at each subsequent level, the number of required moves increases by one move, with two trials per level. Participants advance to the next level only if they correctly complete at least one of the trials in a level, otherwise the task is concluded. This task is not timed. The number of trials performed correctly, block span (length of sequence of moves participant is able to correctly perform), and product score were used for analyses (Battisto et al. 2018).

Timed Up & Go Test (TUG) tests functional mobility. The participants are timed while they rise from a chair, walk three meters as quickly as possible, turn around and return to the chair. Dual-task ability will be measured with the TUG cognitive (TUG-COG) and manual conditions (TUG-Man). In TUG-COG, the participant performs serial subtractions by 3s from a random number ranging from 20-100. In TUG-Man, the participant carries a full glass of water. The correct percentage of subtractions performed during TUG-COG (TUG-COG Counting Performance) and completion times for both tasks were used for analyses, with time $\geq$ 15 seconds for TUG-COG and time $\geq$ 14.5 seconds for TUG-Man indicating impaired dual-task ability and increased fall risk. (Cardon-Verbecq et al. 2017)

Health Literacy

Health Literacy was evaluated with the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Short Test of Functional Health Literacy for Adults (S-TOFHLA). REALM is

a 66-item word recognition test to identify risk for poor literacy skills (Bass, Wilson, and Griffith 2003). REALM associates the numerical raw score of correctly pronounced words to the participants' reading levels: third grade and below (0-18), fourth to sixth grade (19-44), seventh to eighth grade (45-60), and high school (61-66). S-TOFHLA is a seven-minute reading comprehension test to assess comprehension of health-related material and is divided into inadequate (0-16), adequate (17-22), and functional (23-36) categories, based on a 36-item reading comprehension subscale (Baker et al. 1999) (See Appendix A).

Psychosocial Questionnaires

The psychosocial battery includes standard, valid and reliable measures of depression, quality of life, and project satisfaction (See Appendix A).

Beck Depression Inventory-II (BDI-II) and *Geriatric Depression Scale (GDS)* are self-reported surveys measuring depression. BDI-II is scored on a scale range from 0 to 63 and a higher score is associated with depression. GDS has a score range from 0 to 15, and scores higher than 5 indicate possible clinical depression (Beck et al. 1961; Yesavage et al. 1982).

The Short Form 12 (SF-12), a self-reported outcome measure, was used to evaluate mental and physical components of Quality of Life (QOL), with Physical Component Summary (PCS) and Mental Component Summary (MCS) subscales used for composite scores (Ware, Kosinski, and Keller 1996).

Life Space Questionnaire (LSQ) was used to measure the participants' spatial extent of their typical lifestyle. This questionnaire examines participants' living circumstances, routine behavior, and the extent of their mobility (Stalvey et al. 1999).

Data Analysis

Descriptive statistics were calculated and compared between groups using Chi square tests or Fischer's exact tests for categorical variables and one-way analysis of variance (ANOVA) for continuous variables. For outcome analyses, the covariates age, sex, education years, and fall worry were used to control for demographic differences between in-person and remote groups, as these categories could potentially influence outcome measures between groups. Adjusting for the baseline values that were collected at pre-test timepoint and the covariates, analysis of covariance (ANCOVA) was used to compare differences in cognitive, motor cognitive, health literacy, and psychosocial outcomes for in-person and remote groups after intervention (including values obtained at post-test and at eight-week follow-up). . The interaction term of group and timepoint were first included in the model and then dropped because of non-significance found in the change of outcomes from post-test to the eight-week follow-up between groups. Therefore, we analyzed performance outcomes after intervention (at post-test and at eight-week follow-up) without group x time interaction to obtain the adjusted group mean differences (β coefficients) of the group effect to estimate the overall mean difference between the in-person and remote groups with baseline variance removed. Adjusted mean differences were compared with the remote group coded as 0 and the in-person group coded as 1; therefore, for example, negative coefficients for variables in which higher values indicated a better outcome suggests remote group performed better after intervention. A p-value < 0.05 was the significance level. Participant satisfaction ratings in the exit survey were evaluated for groups using Fischer's exact test and Mann Whitney U test. All statistical analyses were carried out using R software (version 3.4.4).

Results

Demographics

130 older adults were included in this study (age 70.89 ± 9.27; In-person DREAMS, n=95; Remote DREAMS, n=35). Descriptive clinical characteristic and demographic statistics of the sample are summarized in Table 1. Within both groups there were more retired (71-87%) than working participants. The in-person group included significantly older participants than the remote group. The groups were similar for other demographic characteristics (Table 1).

Feasibility and Adherence

Both programs were feasible in accomplishing experimental set-up and programmatic objectives and methods. The in-person program recruited faculty members and medical students to lecture and educate participants about current translational and clinical aging research. Wesley Woods Health Center was utilized for lecture space. We were also able to include the 20% of in-person participants who lacked their own transportation (n=19) in the program by providing them with transportation. Further areas of feasibility in the in-person program included successfully coordinating a time for the lectures that worked for many older adults, medical students and faculty, largely addressing auditory and visual limitations among participants (some individuals complained of not hearing well in the lecture room), and consistently attempting to provide members during the small group discussion an equal opportunity to share their thoughts on the lecture. The remote program included an effective process in which study staff created a cohesive binder of study materials covering health related topics. The process also included calling participants weekly with questions about each module to maintain motivation and participant engagement, finding appropriate times to call participants during the week after they

read their module, confirming that calls were completed on a weekly basis, and offering supplemental material for each lesson topic to enhance participants' knowledge.

Adherence to each program was strong. Eighty of 95 participants began and completed six out of eight modules in the DREAMS in-person program. The in-person program had 15 enrolled participants who withdrew (15-16% attrition rate) either before attending any classes (n=6) or before completing at least six of the modules (n=9) with the most frequent reason being a report of no longer enjoying or being interested in the classes. Other reasons included having a busy schedule and health-related problems limiting them from participating in assessments. All remote participants began and completed (n=35) the remote program with 0% attrition.

Satisfaction

The satisfaction survey showed that both in-person and remote participants reported they agreed or strongly agreed that the classes or activities enhanced their knowledge and skills about health topics, influenced how they take care of themselves, and provided them with useful information. Additionally, both groups agreed or strongly agreed that the quality of classes and activity content were high and that they would attend future programs offered. Participants strongly agreed that they enjoyed participating in the program and agreed that they would continue this program if they could, and that their physical and mental activity increased due to the program (Table 3).

Furthermore, responses to the four open-ended questions reflected positive and useful feedback for future interventions. Many in-person participants said the class about dementia was their favorite presentation. One participant stated, "I learned some of the things I can do and some food I can eat to maybe keep me from getting dementia or Alzheimer's – walking, crossword puzzles, more fruits and vegetables, eat less red meat." Several in-person participants

also responded that their least favorite presentation was on vision, and many responded that in the future they would like to learn more about nutrition and exercise plans for seniors. Many remote participants stated the module on kidney disease was their favorite and that they enjoyed learning how to manage their health to prevent future health disparities. Comments and suggestions included increasing the length of in-person classes and providing more references and websites as supplemental materials to the modules for the remote program.

Outcome Measures

Significant group effects for performance outcomes adjusted for baseline after the intervention were detected.

Cognitive Tasks

Remote participants performed significantly better than in-person participants after intervention on MoCA (β= -0.466, p=0.015), TMT B (β=4.215, p<.001) and TMT B-A (β= 6.064, p=0.003), CWIT Inhibition/Switching scaled error score (condition 4) (β= -0.405, p=0.045), Corsi Blocks number of correct trials (β = -0.204, p=0.012) and product score (β =-1.425, p=0.033), and Serial 3 Subtractions percentage correct (β =-3.205, p<.001).

In-person participants performed significantly better than remote participants after intervention on ToL mean first move time scaled (β= 0.300, p=0.023), TMT A (β =-1.341, p<.001), completion time scaled scores for CWIT Word Reading (condition 2) (β= 0.263, p=0.042) and Inhibition/Switching (condition 4) (β= 0.124, p=0.044) (Table 4).

Motor Cognitive Tasks

Remote participants performed significantly better than in-person participants after the intervention on BPST with a greater number of trials completed (β =-0.404, p=<.001), greater span (β =-0.267, p=<.001), and greater product score (β=-2.782, p<.001); whereas in-person

participants performed significantly better on TUG-COG, a timed task, with a faster completion time (β=-0.336, p=0.026) compared to remote participants after intervention (Table 4).

Psychosocial Questionnaires

In-person participants had significantly lower depression scores compared to remote participants after intervention on both BDI-II (β =-1.697, p=0.002) and GDS (β =-0.257, p=0.02). Additionally, in-person participants had significantly higher SF-12 MCS scores (β = 2.377, p=0.008) compared to remote participants following the intervention (Table 5).

Discussion

Both DREAMS groups (in-person and remote) had similar levels of feasibility and highly ranked satisfaction levels. The remote group had lower attrition compared to the in-person group. After controlling for age, sex, education years, and fall worry and adjusting for baseline values, performance differences following intervention between in-person and remote groups on cognitive and motor cognitive measures were domain specific, as performance by group varied on tasks assessing global cognition, executive function, spatial memory**,** mental tracking capacity, and motor and cognitive integration. Remote participants compared to in-person participants performed significantly better after intervention on global cognition (MoCA), task switching (TMT B, TMT B-A, CWIT Inhibition/Switching scaled error score), visuospatial cognition consistency and function (Reverse Corsi Blocks correct trials and product score), mental tracking capacity (Serial 3 Subtractions), and had better whole-body spatial cognition (BPST). In-person participants had significantly better performance on planning (ToL mean first move time scaled), visuospatial processing (TMT A), processing speed of a verbal word reading (CWIT Word Reading completion time) and inhibition/switching tasks (CWIT Inhibition/Switching completion time), and faster motor cognition (TUG-COG completion time) compared to remote participants following intervention. In-person participants also exhibited significantly better psychosocial function compared to remote participants after intervention, reporting lower depression (BDI-II and GDS) and a higher quality of life (SF-12 MCS).

Feasibility

Our prediction that in-person and remote programs would be similar in feasibility was observed, as both programs were highly viable in regard to experimental set-up and programming. The feasibility of the in-person program suggests this delivery method has

potential for successful implementation of group learning. By anticipating programmatic barriers, the group learning protocol was viable, effective, and in line with best practices for a successful intervention (Tickle-Degnen 2013). The remote-program's feasible outcomes suggest that simpler "low-tech" methods may have effective qualities and little acknowledged advantages over web-based technology programs. These "low-tech" models avoided issues associated with higher-tech protocols, such as technical difficulties with video and audio connection, feelings of inadequacy among older adults who lack computer proficiency, and decreased engagement and skepticism about using web-based programs among older populations (Vaportzis, Clausen, and Gow 2017)

Adherence

The 15-16% attrition rate observed among the in-person group is relatively low, as other in-person health education programs have documented a 20-25% attrition rate on average (Valentine and McHugh 2007; Amico 2009). The relatively low attrition of in-person participants may reflect effectiveness of the discussion groups, as research indicates that increasing inclusion of participants in peer discussion by encouraging each participant to share their own thoughts can improve self-confidence among participants (Dehi Aroogh and Mohammadi Shahboulaghi 2020). Age may have also played a factor in program completion status, as in a post-hoc analysis non-completers were significantly older in age compared to participants who completed the study (See Appendix B).

Remarkably, the remote program had a 0% attrition rate, possibly due to greater accessibility of the model that allowed for increased research participation among older adults who identified with health limitations, such as mobile impairments (Hahn and Rahman 2016). Solo learning compared to group engagement may also keep participants more engaged through

a personalized method and reduce feelings of inadequacy or social pressure that may arise in a group learning environment, possibly contributing to no attrition observed in the remote program (Ryan et al. 2020). Far fewer participants attended the remote compared to the in-person program so these findings should be interpreted with caution.

Satisfaction

The exit survey revealed high satisfaction for the program overall as both groups agreed or strongly agreed that the classes enhanced their knowledge and influenced how they would take care of themselves, implying the intervention's positive effect for impacting the future lives of participants. Participant willingness to attend future programs and classes for the study indicates their overall commitment to the goals of the intervention and perhaps will result in stronger advocacy for increasing health education knowledge among older, diverse adults. Positive feedback, such as suggesting in-person classes to be longer and increasing the number of supplemental materials provided to the remote group, as well as comments about what participants learned post-intervention both indicate a marked inclination for older adults to participate and remain involved in future research. To further understand the impact of the in-person and remote programs on knowledge acquisition, participants should be called over the following years after the study.

Cognitive and Motor Cognitive Performance

Differences in cognitive and motor cognitive outcomes between in-person and remote groups after intervention appeared to be domain specific.

Enhanced global cognition (MoCA) found among remote participants compared to in-person participants after intervention suggests solo coaching methods prioritize participants' personalized learning goals, resulting in increased concentration, conceptual thinking, and

attention. Faster cognitive processing speed (TMT B, TMT B-A) and better executive function on an inhibition/switching task (CWIT Inhibition/Switching scaled error score) were observed among remote participants after intervention compared to in-person participants. Studies indicate that increasing processing speed and switching attention between tasks is associated with consistent practice and taking more time to understand and learn concepts (Carrier et al. 2015); both occurred under the remote model as participants read the modules on their own time. Compared to in-person participants, remote participants had significantly better visuospatial cognition consistency and function (Reverse Corsi Blocks) following intervention. Short-term working memory is involved in the Reverse Corsi Blocks task. Perhaps in-person participants did not perform better than remote participants because connecting new and familiar learned information via group engagement can be associated with collaborative inhibition, the concept that people who remember together in a group may recall less information than if they remembered alone due to memory interference caused by the product of recall (Wright and Klumpp 2004). Mental tracking capacity, based on Serial 3 Subtractions percentage correct, was significantly better in remote participants compared to in-person participants after intervention. Serial 3 Subtractions focuses on one's ability to sustain focus while performing a cognitive operation over repeated trials as a facet of mental tracking (Sandberg 2011). The solo coaching model emphasized the following: highly personalized interactions between callers and participants, low social anxiety, and avoidance of overstimulation and distractions caused by peers – factors attributed to increased attention and concentration which may explain why remote participants performed better than in-person participants on mental tracking.

In-person participants performed significantly better on planning and organization abilities, as parts of executive function based on ToL, compared to remote participants after

intervention. Additionally, compared to the remote group, the in-person group had significantly better visuospatial and cognitive processing speed per several of the neuropsychological measures (TMT, CWIT) after intervention. Development of executive function and faster cognitive processing speed have been associated with interpersonal interactions and social relationships, specifically due to increased perspective taking, conforming and adhering to social rules, and thoughtful communication that occurs in the presence of peers. Therefore, these actions observed during the in-person program may create important opportunities for the acquisition and continued practice of executive functioning and cognitive processing skills (Perry et al. 2019).

Compared to in-person participants, remote participants had significantly better whole body spatial cognition, indicated by more BPST completed trials, span, and product score following intervention. BPST does not include time as a factor and also focuses on spatial learning and short-term working memory. Since the remote model allowed participants to learn at their own pace, re-read modules in the binder that they did not initially understand, and enhance retention of the material through 1:1 weekly conversation, perhaps performance differences are due to the combined effects of enhancing attention and memory while having no learning time limit. In comparison, the in-person group learned directly from lectures that took place with a faculty "expert" during a specific time every week, and in-person participants were not able to review past lectures. On the other hand, in-person participants had significantly faster motor cognition, measured by TUG-COG completion time, compared to remote participants following intervention. Connections between cognitive and motor function deficits and aging have been elucidated, as older adults are more likely to have decreased mental processing and slower movement coordination; however, studies indicate that amplifying social engagement

with individuals beyond one's usual social circle of family and close friends may restore higher levels of cognitive and physical activity (Seidler et al. 2010; Gardner 2014). Thus, utilizing a stimulating learning task to connect diverse older adults and create strong relationships, as observed in the in-person model, may contribute to faster completion times on cognitive and motor cognitive measures.

Psychosocial Performance

Likely due to increased social engagement, in-person participants reported significantly lower scores on BDI-II and GDS compared to remote participants after intervention, indicating lower depression levels. Research observing how learning impacts health among diverse, older students shows that in-person group learning has been found to increase well-being, reduce stress-inducing circumstances, and increase a sense of purpose among students due to higher social integration and social support from peers (Hammond 2004). Additionally, in-person participants had significantly higher SF-12 MCS scores following the intervention in comparison to remote participants, suggesting these participants had less role limitations caused by emotional problems, vitality, social functioning, and mental health.

Limitations

This study had several limitations. The remote group had a smaller sample size than the in-person group. Unequal sample sizes reduce power to detect effects and increase the chances of making a Type I, i.e., "false positive," error (Rusticus and Lovato 2014). Remote participants were recruited after many of the in-person participants were recruited; therefore, although participants were not offered a choice of treatment, the trial was not randomized. Participants were recruited from the Atlanta metro geographical area, specifically from local community partner organizations, outreach programs, and diverse senior living facilities. Therefore, findings

may not be generalizable to older populations not living in this specific geographical location. Our study was a cohort observational design rather than a randomized controlled trial, therefore, unmeasured differences in the remote versus in-person learning environments may have affected results in currently unknown ways. Additionally, it is possible that the literacy tools used in the study were not able to detect all effects of this study; The *Learning Theory* states that knowledge acquisition might affect aspects of literacy (Wolf et al. 2009). Other tools can be considered in the future.

Future Direction

Aging and minority communities play a significant role in improving methods for understanding health disparities and spreading health education models to a wider audience, especially during current-day world events like COVID-19, which has resulted in higher morbidity and mortality rates among diverse, older adults (Kemenesi et al. 2020; Cyrus et al. 2020). Thus, further participation recruitment among aging, minority populations is relevant. To more thoroughly examine differential influences of group versus solo learning methods on cognitive and psychosocial wellness, in-person and remote controls for both learning styles should be included in future studies. An in-person, non-peer interaction control group can examine the extent to which a group learning stimulation affects performance outcomes. A remote, non-solo learning control group that engages in weekly follow-up discussions with multiple participants on a monitored call would aim at eliminating 1:1 interaction to further determine solo coaching effects of the model. Change in performance scores between pre- and post-intervention timepoints could determine effects of the intervention on health and well-being improvements for participants. Researchers could then measure clinical significance, which refers to the magnitude of treatment effect, to determine how meaningful the differences in

cognitive and psychosocial outcomes are between groups due to the intervention (Ranganathan, Pramesh, and Buyse 2015). Specific differences in performance outcomes between the in-person and remote programs could also be utilized to power a larger, controlled trial in the future.

Conclusion

In conclusion, In-person and Remote DREAMS were effective delivery models of health education, as both programs were feasible in terms of successfully accomplishing experimental set-up and programmatic objectives. The delivery methods varied in attrition rates, but both were ranked with high satisfaction among participants. We also presented evidence that after intervention, cognitive and motor cognitive outcomes differed between groups and were domain specific; whereas, compared to remote participants, in-person participants had better psychosocial outcomes, indicated by lower depression and a greater quality of life. This research has important implications for understanding the efficacy of an in-person versus remote health education model. By identifying the more effective delivery method for individuals with identifiable characteristics, we can increase involvement of diverse, older adults in research, and ultimately reduce health disparities by enhancing cognition, motor cognitive, health literacy, and psychosocial outcomes through engagement and active learning.

Table 1. Demographic Characteristics by Group (In-Person vs. Remote)

Characteristics	Total (n=130) Mean(SD)/N(%)	In-Person (n=95) Mean(SD)/N(%)	Remote (n=35) Mean(SD)/N(%)	*P* Values
Sex^				0.799
Female	84 (64.62)	62 (65.26)	22 (62.86)	
Male	46 (35.38)	33 (34.74)	13 (37.14)	
Age (years)[1]	70.89 (9.27)	71.96 (9.50)	68.00 (8.05)	0.030*
Educations (years)[1]	15.85 (2.28)	15.96 (2.28)	15.54 (2.28)	0.359
Marital Status^				0.583
Single	16 (12.31)	10 (10.53)	6 (17.14)	
Married	61 (46.92)	45 (47.37)	16 (45.71)	
Other[2]	53 (40.77)	40 (42.11)	13 (37.14)	
Ethnicity^				0.364
Black	51 (39.84)	35 (37.63)	16 (45.71)	
White	66 (51.56)	48 (51.61)	18 (51.43)	
Other[3]	11 (8.59)	10 (10.75)	1 (2.86)	
Housing^				0.057
House/Apt/Condo	96 (73.85)	65 (68.42)	31 (88.57)	
Senior Housing	31 (23.85)	27 (28.42)	4 (11.43)	
Other[4]	3 (2.31)	3 (3.16)	0 (0.00)	
Transportation^				0.957
Drive Own Vehicle	102 (79.69)	74 (79.57)	28 (80.00)	
Other[5]	26 (20.31)	19 (20.43)	7 (20.00)	
Occupational Status^				0.032*
Employed	22 (16.92)	12 (12.63)	10 (28.57)	
Not Employed[6]	108 (83.08)	83 (87.37)	25 (71.43)	
Years Retired^^[1]	11.59 (10.69)	12.32 (11.65)	9.36 (6.66)	0.263
Number of Comorbidities[1]	3.06 (2.22)	3.02 (2.05)	3.17 (2.65)	0.734
Use Assistive Device for Walking^				0.054
No	97 (74.62)	72 (75.79)	25 (71.43)	
Yes	20 (15.38)	11 (11.58)	9 (25.71)	
Sometimes	13 (10.00)	12 (12.63)	1 (2.86)	
Number of Medications[1]	4.14 (3.53)	3.93 (3.32)	4.68 (4.06)	0.298
Falls in Previous Year[1]	0.95 (2.70)	0.68 (1.84)	1.71 (4.21)	0.058
Fall Worry[1]	2.48 (1.39)	2.59 (1.46)	2.17 (1.15)	0.124
Self-Rated Quality of Life[1]	5.51 (1.23)	5.49 (1.18)	5.57 (1.36)	0.737

Composite Physical Function (CPF) Score (/24) [1]	19.96 (5.09)	20.08 (4.95)	19.63 (5.49)	0.652
Frequency of Leaving House^				0.350
< 1 per week	2 (1.54)	2 (2.11)	0 (0.00)	
1-2 times per week	8 (6.15)	4 (4.21)	4 (11.43)	
3-4 times per week	48 (36.92)	34 (35.79)	14 (40.00)	
Everyday	72 (55.38)	55 (57.89)	17 (48.57)	

^ Chi-square tests or Fisher's exact tests were used for categorical variables.

^^Excluding those who have not retired or missing data.

[1] One-way ANOVA were used for continuous variables.

[2] Includes Separated/Divorced, and Windowed

[3] Includes Asian, Hispanic/Latino, Native American, Multiracial, and other races.

[4] Includes assisted living, relative homes, and others.

[5] Includes family/friends drive, transportation service, and public transportation.

[6] Includes those who are not employed full or part time (homemaker, retired, volunteer, unemployed, disabled)

**P* values indicate significant differences between groups at the 0.05 level

Table 2: Topics Presented in the DREAMS Program

Session	Course A	Course B	Course C	Course D
Week 1	Research and Creativity in Later Life	Research and Creativity in Later Life	Research and Creativity in Later Life	Research and Creativity in Later Life
Week 2	Eyelid Ptosis and the Impairment of Vision	Bladder Matters in Aging Research	Role of Commensal Microbiota in Health Span	Role of Commensal Microbiota in Health Span
Week 3	End of Life, Palliative Care, Assisted Living	Dementia Family Caregiver Research	Thai Chi Studies: What have we Learned	Macular Degeneration- Fact or Fiction
Week 4	Hand Motor Function	Social Determinants of Health and Disparities	Neuromechanics Principles in Rehabilitation	Patient Perception of the Discharge Process
Week 5	Cardiovascular Health	Research in Specialized Nutrition Support	Cognition in Aging	Thai Chi Studies: What Have We Learned
Week 6	Dementia Family Caregiver Research	Role of Commensal Microbiota in Health Span	Eye Health	Cognition, Anesthesia and Older Adults
Week 7	Role of Commensal Microbiota in Health Span	Common Causes of Vision Loss	Cognition, Anesthesia and Older Adults	Pneumococcal Carriage Study in the Elderly
Week 8	Urinary Incontinence	End of Life, Palliative Care, Assisted Living	Balance and Falls in Individuals with Parkinson's Disease	Balance and Falls in Individuals with Parkinson's Disease

Lessons covered by In-Person DREAMS participants over eight consecutive weeks by course: Course A (n=24); Course B (n=23); Course C (n=26); Course D (n=22)

Table 3: Satisfaction Questionnaire Results Assessing Participant Views on DREAMS In-Person vs. Remote

Exit Survey Prompts^	Entire Sample (n=112) Median (IQR)	In-Person DREAMS (n=79) Median (IQR)	Remote DREAMS (n=33) Median (IQR)	*P* Values[1]	*P* Values[2]
1. The classes or activities have enhanced my knowledge/skills about the topics.	5 [4, 5]	4 [4, 5]	5 [4, 5]	0.271	0.282
2. The classes or activities will influence how I take care of myself.	4 [4, 5]	4 [4, 5]	4 [4, 5]	0.463	0.236
3. The classes or activities have provided me with information I can use.	4.5 [4, 5]	4 [4, 5]	5 [4, 5]	0.791	0.773
4. The quality of the classes or activities and its content was high.	4 [4, 5]	4 [4, 5]	4 [4, 5]	0.743	0.508
5. I would attend future programs, classes and activities offered by this group.	5 [4, 5]	5 [4, 5]	5 [4, 5]	0.529	0.628
6. I enjoyed participating in this program.	5 [4, 5]	5 [4, 5]	5 [4, 5]	1	0.951
7. If I could, I would continue participating in this program.	4 [4, 5]	4 [4, 5]	4 [4, 5]	0.957	0.683
8. I have been more physically active.	4 [3, 4]	4 [3, 4]	4 [3, 4]	0.898	0.844
9. I have been more mentally active.	4 [4, 5]	4 [3, 4]	4 [4, 5]	0.427	0.997

Statements about DREAMS in-person and remote programs and its influence on different aspects of the participants' life

^Exit survey prompts were presented on a five-point Likert scale (1=strongly disagree; 2=strongly agree; 3=neutral; 4=agree; 5=strongly agree)

[1]Fischer's exact test comparing participants from In-person and Remote DREAMS

[2]Mann Whitney U test comparing participants from In-person and Remote DREAMS

Table 4: Pre-test, Post-test, and Follow-Up Values for Outcome Measures in DREAMS In-Person vs. Remote Group

	Pre Mean ± SD/ N (%)	Post Mean ± SD/ N (%)	FUP Mean ± SD/ N (%)	Adjusted Group Mean Difference (β)^	*P* Values [1^^]
Montreal Cognitive Assessment (/30)				-0.466	0.015*
In-Person	24.99±3.44	24.93±3.39	25.32±3.41		
Remote	25.4±3.6	25.8±3.39	25.94±3.28		
Tower of London					
Total Achievement Scaled Score (/19)				0.113	0.313
In-Person	15.43±4.48	17.14±3.8	17.96±4.31		
Remote	16.31±3.41	17.89±2.81	18.2±3.08		
Time Per Move Ratio Scaled (/17-18)				-0.252	0.712
In-Person	8.9±4.06	9.95±3.72	10.24±3.64		
Remote	8.43±3.71	9.77±3.59	10.17±3.14		
Mean First Move Time Scaled (/17-19)				0.300	0.023*
In-Person	10.11±3.3	11.01±3.23	11.36±2.78		
Remote	9.23±3.49	10.03±2.93	10.77±2.88		
Trails Making Test Completion Time (sec)					
TMT A				-1.341	<.001*
In-Person	42.29±33.86	39.78±32.43	41.52±34.11		
Remote	31.8±13.79	32.41±15.13	31.67±14.81		
TMT B				4.215	<.001*
In-Person	114.66±71.18	111.22±73.11	107.62±77.29		
Remote	84.21±64.56	82.34±62.33	80.61±64.61		
TMT B-A				6.064	.003*
In-Person	72.37±61.01	71.44±63.23	66.11±64.64		
Remote	52.41±55.24	49.93±50.74	48.94±52.93		
Color-Word Interference Test[2]					
Completion Time Scaled Scores (/19)					
Color Naming				0.404	0.905
In-Person	9.24±2.94	9.32±3.49	9.41±3.46		
Remote	9.74±2.76	9.2±2.95	9.6±2.98		
Word Reading				0.263	0.042*
In-Person	9.21±3.22	9.36±2.99	9.2±3.37		
Remote	10.03±3.35	9.57±3.32	9.89±3.08		
Inhibition				0.006	0.223
In-Person	10.06±3.39	10.41±3.17	10.43±3.76		
Remote	10.37±3.5	10.43±3.21	11.03±2.79		
Inhibition/Switching				0.124	0.044*
In-Person	8.87±4.02	9.36±4.47	9.5±4.62		
Remote	9.66±3.96	10.11±3.39	10.2±3.5		
Total Error Scaled Scores (/12-13)[3]					
Inhibition				0.05	0.844
In-Person	10.2±2.87	10.5±2.41	10.47±2.49		
Remote	10.34±3.51	10.23±3.36	10.86±2.98		

Inhibition/Switching				-0.405	0.045*
In-Person	9.68±3.48	9.8±3.17	9.85±3.54		
Remote	10.09±3.67	10.11±3.07	11±2.93		
Reverse Corsi Blocks					
Number of Trials				-0.204	0.012*
In-Person	5.3±1.83	5.44±1.71	5.47±1.81		
Remote	5.83±1.77	5.94±1.59	6.03±1.95		
Block Span				-0.124	0.065
In-Person	4.24±1.22	4.2±1.06	4.19±1.04		
Remote	4.49±1.15	4.37±0.88	4.51±1.17		
Product Score				-1.425	0.033*
In-Person	24.39±14.53	24.5±14.19	24.56±13.91		
Remote	28.03±15.4	27.23±13.12	29.29±15.83		
Serial 3 Subtractions Percent Correct (%)				-3.205	<0.001*
In-Person	90.99±15.67	84.92±23.25	88.47±19.98		
Remote	94.85±9.52	92.51±12.34	94.2±14.51		
Body Position Spatial Task					
Number of Trials				-0.404	<.001*
In-Person	3.83±1.35	3.92±1.25	3.98±1.16		
Remote	4.26±1.36	4.43±1.29	4.83±1.58		
Block Span				-0.267	<.001*
In-Person	3.45±0.76	3.44±0.73	3.52±0.76		
Remote	3.74±0.85	3.74±0.78	4.06±0.84		
Product Score				-2.782	<.001*
In-Person	14.07±8.19	14.22±7.45	14.75±7.42		
Remote	16.97±9.11	17.37±8.31	20.66±10.31		
Timed Up & Go					
TUG-COG Completion Time (sec)[4]				-0.336	0.026*
In-Person	14.3±5.09	14.54±5.85	14.54±6.13		
Remote	12.77±5.84	13.76±6.3	12.92±5.99		
TUG-COG Counting Performance[4] Percent Correct (%)				-2.417	0.327
In-Person	85.87±27.23	85.58±28.35	86.8±26.21		
Remote	90.01±25.32	88.41±25.62	90.48±20.98		
TUG-MAN Completion Time (sec)[5]				-0.423	0.191
In-Person	12.2±4.19	12.28±4.02	12.76±5.03		
Remote	12.57±6.01	12.97±5.51	13±6.09		
REALM Score (/66)[6]				0.024	0.458
In-Person	62.74±7.3	63.08±6.78	63.25±6.67		
Remote	62.46±7.14	62.97±6.61	62.89±6.45		

STOFHLA Score (/36)[7]				-0.188	0.144
In-Person	32.39±5.7	33.02±5.09	32.8±4.91		
Remote	32.66±6.14	33.4±5.08	33.69±4.79		

[1]Repeated measures analysis of covariance (ANCOVAs) analyzing adjusted mean differences on cognitive, motor cognitive, and health literacy measures between DREAMS in-person (n=80) vs. remote group (n=35) after intervention; adjusted for baseline performance and covariates age, sex, education years and fall worries
[2]Color Naming (condition 1), Word Reading (condition 2), Inhibition (condition 3), Inhibition/Switching (condition 4) tasks
[3]Corrected and uncorrected errors included in total errors for Inhibition (condition 3) and Inhibition/Switching (condition 4) tasks
[4]Timed Up & Go-Cognition
[5]Timed Up & Go-Manual
[6]Rapid Estimate Adult Literacy Measurement
[7]Short Test of Functional Health Literacy Assessment
^ β coefficient; remote coded as 0 and in-person coded as 1; e.g., negative coefficients for variables in which higher values indicated a better outcome suggests remote group performed better after intervention
^^Performance difference with the main effect of group
**P* values indicate significant differences at the 0.05 level

Table 5: Pre-test, Post-test, and Follow-Up Values for Psychosocial Measures in DREAMS In-Person vs. Remote Group

	Pre Mean ± SD/ N (%)	Post Mean ± SD/ N (%)	FUP Mean ± SD/ N (%)	Adjusted Group Mean Difference(β)^	*P* Values[1] ^^
Beck Depression Index-II (/63)[2]				-1.697	0.002*
In-person	7.31±6.21	6.84±6.42	6.4±5.5		
Remote	8±7.13	8.86±7.05	8.49±8.27		
Geriatric Depression Scale (/15)[3]				-0.257	0.020*
In-person	2.1±2.28	2.2±2.21	2.29±2.75		
Remote	2.6±2.51	3.03±3.1	2.69±3.06		
Short Form-12 (/100)					
Mental Component Summary				2.377	0.008*
In-person	52.99±7.83	54±8.16	54.01±8.24		
Remote	52.44±9.79	50.77±8.71	52.11±9.57		
Physical Component Summary				-1.125	0.119
In-person	45.97±9.64	44.86±10.92	45.06±11.46		
Remote	46.44±12.27	46.15±11.99	46.79±10.95		
Life Space Questionnaire				-0.168	0.076
In-person	6.49±1	6.21±1.09	6.35±1.27		
Remote	6.43±1.27	6.37±1.17	6.74±1.04		

[1]Repeated measures analysis of covariance (ANCOVAs) analyzing adjusted mean differences on psychosocial measures between DREAMS in-person (n=80) vs. remote group (n=35) after intervention; adjusted for baseline performance and covariates age, sex, education years and fall worries

[2]Higher Scores indicate worsening function/performance

[3]Score > 5 points suggests depression

^ β coefficient; remote coded as 0 and in-person coded as 1; e.g., negative coefficients for variables in which higher values indicated a better outcome suggests remote group performed better after intervention

^^Performance difference with the main effect of group

**P* values indicate significant differences at the 0.05 level

Works Cited

Amico, K. Rivet. 2009. "Percent Total Attrition: A Poor Metric for Study Rigor in Hosted Intervention Designs." *American Journal of Public Health* 99, no. 9: 1567–75. https://doi.org/10.2105/AJPH.2008.134767.

Archibald, Mandy M., Rachel C. Ambagtsheer, Mavourneen G. Casey, and Michael Lawless. 2019. "Using Zoom Videoconferencing for Qualitative Data Collection: Perceptions and Experiences of Researchers and Participants." *International Journal of Qualitative Methods* 18, no. January: 1609406919874596. https://doi.org/10.1177/1609406919874596.

Baker, D. W., M. V. Williams, R. M. Parker, J. A. Gazmararian, and J. Nurss. 1999. "Development of a Brief Test to Measure Functional Health Literacy." *Patient Education and Counseling* 38, no. 1: 33–42. https://doi.org/10.1016/s0738-3991(98)00116-5.

Bass, Pat F, John F Wilson, and Charles H Griffith. 2003. "A Shortened Instrument for Literacy Screening." *Journal of General Internal Medicine* 18, no. 12: 1036–38. https://doi.org/10.1111/j.1525-1497.2003.10651.x.

Battisto, Jessica, Katharina V. Echt, Steven L. Wolf, Paul Weiss, and Madeleine E. Hackney. 2018. "The Body Position Spatial Task, a Test of Whole Body Spatial Cognition: Comparison between Adults with and without Parkinson's Disease." *Neurorehabilitation and Neural Repair* 32, no. 11: 961–75. https://doi.org/10.1177/1545968318804419.

Beck, A. T., C. H. Ward, M. Mendelson, J. Mock, and J. Erbaugh. 1961. "An Inventory for Measuring Depression." *Archives of General Psychiatry* 4, no. June: 561–71. https://doi.org/10.1001/archpsyc.1961.01710120031004.

Beck, Aaron T. 1996. *Beck Depression Inventory*. San Antonio: Harcourt Brace and Company.

Boot, Walter R., Neil Charness, Sara J. Czaja, Joseph Sharit, Wendy A. Rogers, Arthur D. Fisk, Tracy Mitzner, Chin Chin Lee, and Sankaran Nair. 2015. "Computer Proficiency Questionnaire: Assessing Low and High Computer Proficient Seniors." *The Gerontologist* 55, no. 3: 404–11. https://doi.org/10.1093/geront/gnt117.

Bristow, Thomas, Chwan-Shyang Jih, Artrina Slabich, and Jamie Gunn. 2016. "Standardization and Adult Norms for the Sequential Subtracting Tasks of Serial 3's and 7's." *Applied Neuropsychology. Adult* 23, no. 5: 372–78. https://doi.org/10.1080/23279095.2016.1179504.

Campana, Kathleen, and Naresh Kumar Agarwal. 2019. "The Landscape of Research on Learning in Low-Tech Environments." *Information and Learning Sciences* 120, no. 11/12: 687–703. https://doi.org/10.1108/ILS-10-2019-0103.

Cardon-Verbecq, Charlotte, Marine Loustau, Emilie Guitard, Marie Bonduelle, Emmanuelle Delahaye, Pierre Koskas, and Agathe Raynaud-Simon. 2017. "Predicting Falls with the Cognitive Timed Up-and-Go Dual Task in Frail Older Patients." *Annals of Physical and Rehabilitation Medicine* 60, no. 2: 83–86. https://doi.org/10.1016/j.rehab.2016.07.003.

Carrier, L. Mark, Larry D. Rosen, Nancy A. Cheever, and Alex F. Lim. 2015. "Causes, Effects, and Practicalities of Everyday Multitasking." *Developmental Review*, Special Issue: Living in the "Net" Generation: Multitasking, Learning, and Development, 35, no. March: 64–78. https://doi.org/10.1016/j.dr.2014.12.005.

Christensen, Kaare, Gabriele Doblhammer, Roland Rau, and James W Vaupel. 2009. "Ageing Populations: The Challenges Ahead." *Lancet* 374, no. 9696: 1196–1208. https://doi.org/10.1016/S0140-6736(09)61460-4.

Craik, Fergus I. M., and Endel Tulving. 1975. "Depth of Processing and the Retention of Words in Episodic Memory." *Journal of Experimental Psychology: General* 104, no. 3: 268–94. https://doi.org/10.1037/0096-3445.104.3.268.

Crocker, Laura D., Wendy Heller, Stacie L. Warren, Aminda J. O'Hare, Zachary P. Infantolino, and Gregory A. Miller. 2013. "Relationships among Cognition, Emotion, and Motivation: Implications for Intervention and Neuroplasticity in Psychopathology." *Frontiers in Human Neuroscience* 7: 261. https://doi.org/10.3389/fnhum.2013.00261.

Cyrus, E., R. Clarke, D. Hadley, Z. Bursac, MJ. Trepka, J. G. Dévieux, U. Bagci, et al. 2020. "The Impact of COVID-19 on African American Communities in the United States." *MedRxiv*, May. https://doi.org/10.1101/2020.05.15.20096552.

Davis, Terry C., Connie L. Arnold, Glenn Mills, and Lucio Miele. 2019. "A Qualitative Study Exploring Barriers and Facilitators of Enrolling Underrepresented Populations in Clinical Trials and Biobanking." *Frontiers in Cell and Developmental Biology* 7: 74. https://doi.org/10.3389/fcell.2019.00074.

Dehi Aroogh, Manijeh, and Farahnaz Mohammadi Shahboulaghi. 2020. "Social Participation of Older Adults: A Concept Analysis." *International Journal of Community Based Nursing and Midwifery* 8, no. 1: 55–72. https://doi.org/10.30476/IJCBNM.2019.82222.1055.

Delis, D.C., E. Kaplan, J.H. Kramer. 2001 "Delis-Kaplan Executive Function System (D-KEFS)." doiLanding?doi=10.1037%2Ft15082-000.

DeWinstanley, Patricia Ann, and Elizabeth Ligon Bjork. 2004. "Processing Strategies and the Generation Effect: Implications for Making a Better Reader." *Memory & Cognition* 32, no. 6: 945–55. https://doi.org/10.3758/BF03196872.

Dillard, Rebecca L., Molly Perkins, Ariel Hart, Chaohua Li, Ron Wincek, David Jones, and Madeleine E. Hackney. 2018. "Research Advocacy Training Program Benefits Diverse Older Adults in Participation, Self-Efficacy and Attitudes toward Research." *Progress in Community Health Partnerships: Research, Education, and Action* 12, no. 4: 367–80. https://doi.org/10.1353/cpr.2018.0062.

Gardner, Paula. 2014. "The Role of Social Engagement and Identity in Community Mobility among Older Adults Aging in Place." *Disability and Rehabilitation* 36, no. 15: 1249–57. https://doi.org/10.3109/09638288.2013.837970.

Garfin, Dana Rose. 2020. "Technology as a Coping Tool during the Coronavirus Disease 2019 (COVID-19) Pandemic: Implications and Recommendations." *Stress and Health: Journal of the International Society for the Investigation of Stress* 36, no. 4: 555–59. https://doi.org/10.1002/smi.2975.

Greenberg, Sherry A. 2012. "The Geriatric Depression Scale (GDS)." *Try This: Best Practices in Nursing Care to Older Adults* (New York), 2012. https://wwwoundcare.ca/Uploads/ContentDocuments/Geriatric%20Depression%20Scale.pdf

Hackney, Madeleine E., Colleen Byers, Gail Butler, Morgan Sweeney, Lauren Rossbach, and Aaron Bozzorg. 2015. "Adapted Tango Improves Mobility, Motor-Cognitive Function, and Gait but Not Cognition in Older Adults in Independent Living." *Journal of the American Geriatrics Society* 63, no. 10: 2105–13. https://doi.org/10.1111/jgs.13650.

Hahn, T., and H. Ur Rahman. 2016. "Remote Access Programs to Better Integrate Individuals with Disabilities." In *2016 Research on Equity and Sustained Participation in Engineering, Computing, and Technology (RESPECT)*, 1–2. https://doi.org/10.1109/RESPECT.2016.7836176.

Halpin, Sean N., Rebecca L. Dillard, Ellen Idler, Carolyn Clevenger, Elizabeth Rothschild, Sarah Blanton, Jessica Wilson, and Jonathan M. Flacker. 2017. "The Benefits of Being a Senior Mentor: Cultivating Resilience through the Mentorship of Health Professions Students." *Gerontology & Geriatrics Education* 38, no. 3: 283–94. https://doi.org/10.1080/02701960.2015.1079707.

Hammond, Cathie. 2004. "Impacts of Lifelong Learning upon Emotional Resilience, Psychological and Mental Health: Fieldwork Evidence." *Oxford Review of Education* 30, no. 4: 551–68. https://doi.org/10.1080/0305498042000303008.

Hansen, J. D., and J. Reich. 2015. "Democratizing Education? Examining Access and Usage Patterns in Massive Open Online Courses." *Science* 350, no. 6265: 1245–48. https://doi.org/10.1126/science.aab3782.

Hart, Ariel R., Rebecca Dillard, Molly M. Perkins, Camille P. Vaughan, Kathy Kinlaw, J. Lucas McKay, Drenna Waldrop-Valverde, Kimberley Hagen, Ron C. Wincek, and Madeleine E. Hackney. 2017. "The DREAMS Team: Creating Community Partnerships through Research Advocacy Training for Diverse Older Adults." *Educational Gerontology* 43, no. 9: 440–50. https://doi.org/10.1080/03601277.2017.1321449.

Hunt, R. R., and M. A. Mcdaniel. 1993. "The Enigma of Organization and Distinctiveness." *Journal of Memory and Language* 32, no. 4: 421–45. https://doi.org/10.1006/jmla.1993.1023.

Inglis, Sally C., Robyn A. Clark, Riet Dierckx, David Prieto-Merino, and John G. F. Cleland. 2015. "Structured Telephone Support or Non-Invasive Telemonitoring for Patients with Heart Failure." *The Cochrane Database of Systematic Reviews*, no. 10 (October): CD007228. https://doi.org/10.1002/14651858.CD007228.pub3.

Kaiser, Betty L., Gay R. Thomas, and Barbara J. Bowers. 2017. "A Case Study of Engaging Hard-to-Reach Participants in the Research Process: Community Advisors on Research Design and Strategies (CARDS)®." *Research in Nursing & Health* 40, no. 1: 70–79. https://doi.org/10.1002/nur.21753.

Kaller, Christoph P., Josef M. Unterrainer, Stefan Kaiser, Matthias Weisbrod, Rudolf Debelak, and Steffen Aschenbrenner. "Tower of London – Freiburg Version." In *Vienna Test System Manual*, 12-15. Mödling: Schuhfried.

Kemenesi, Gábor, László Kornya, Gábor Endre Tóth, Kornélia Kurucz, Safia Zeghbib, Balázs A. Somogyi, Viktor Zöldi, Péter Urbán, Róbert Herczeg, and Ferenc Jakab. 2020. "Nursing Homes and the Elderly Regarding the COVID-19 Pandemic: Situation Report from Hungary." *GeroScience*, May, 1–7. https://doi.org/10.1007/s11357-020-00195-z.

Kessels, Roy P. C., Esther van den Berg, Carla Ruis, and Augustina M. A. Brands. 2008. "The Backward Span of the Corsi Block-Tapping Task and Its Association with the WAIS-III Digit Span." *Assessment* 15, no. 4: 426–34. https://doi.org/10.1177/1073191108315611.

Kuczmarski, Marie Fanelli, May A. Beydoun, Nancy Cotugna, Loran Daniels, Marc A. Mason, Alan B. Zonderman, and Michele K. Evans. 2016. "Literacy Contributes to Greater Higher Diet Quality in a Socioeconomically Diverse Urban Prospective Cohort." *Topics in Clinical Nutrition* 31, no. 1: 47–58. https://doi.org/10.1097/TIN.0000000000000057.

Lippa, Sara M., and Robert N. Davis. 2010. "Inhibition/Switching Is Not Necessarily Harder than Inhibition: An Analysis of the D-KEFS Color-Word Interference Test." *Archives of Clinical Neuropsychology: The Official Journal of the National Academy of Neuropsychologists* 25, no. 2: 146–52. https://doi.org/10.1093/arclin/acq001.

McCoy, Cindy. 2010. “Perceived Self-Efficacy and Technology Proficiency in Undergraduate College Students.” *Computers & Education* 55, no. 4: 1614–17. https://doi.org/10.1016/j.compedu.2010.07.003.

Medin, Douglas, and Brian Ross. 2001. “Cognitive Psychology,” January.

Meij, H., and Jan Meij. 2016. “The Effects of Reviews in Video Tutorials.” *Journal of Computer Assisted Learning* 32, no. March: n/a-n/a. https://doi.org/10.1111/jcal.12136.

Morgan, R.L., J.E. Whorton, and C. Gunsalus. 2000. “A Comparison of Short-Term and Long-Term Retention: Lecture Combined with Discussion versus Cooperative Learning.” *Journal of Instructional Psychology* 27, no. January: 53–58.

Mukhalalati, Banan Abdulrzaq, and Andrea Taylor. 2019. “Adult Learning Theories in Context: A Quick Guide for Healthcare Professional Educators.” *Journal of Medical Education and Curricular Development* 6, no. April. https://doi.org/10.1177/2382120519840332.

Nasreddine, Ziad S., Natalie A. Phillips, Valérie Bédirian, Simon Charbonneau, Victor Whitehead, Isabelle Collin, Jeffrey L. Cummings, and Howard Chertkow. 2005. “The Montreal Cognitive Assessment, MoCA: A Brief Screening Tool for Mild Cognitive Impairment.” *Journal of the American Geriatrics Society* 53, no. 4: 695–99. https://doi.org/10.1111/j.1532-5415.2005.53221.x.

Patel, Sadiq Y., Ateev Mehrotra, Haiden A. Huskamp, Lori Uscher-Pines, Ishani Ganguli, and Michael L. Barnett. 2021. “Trends in Outpatient Care Delivery and Telemedicine During the COVID-19 Pandemic in the US.” *JAMA Internal Medicine* 181, no. 3: 388–91. https://doi.org/10.1001/jamainternmed.2020.5928.

Perkins, Molly M., Ariel Hart, Rebecca L. Dillard, Ronald C. Wincek, David E. Jones, and Madeleine E. Hackney. 2019. “A Formative Qualitative Evaluation to Inform Implementation of a Research

Participation Enhancement and Advocacy Training Program for Diverse Seniors: The DREAMS Program." *Journal of Applied Gerontology: The Official Journal of the Southern Gerontological Society* 38, no. 7: 959–82. https://doi.org/10.1177/0733464817735395.

Perry, Rosemarie E., Stephen H. Braren, Millie Rincón-Cortés, Annie N. Brandes-Aitken, Divija Chopra, Maya Opendak, Cristina M. Alberini, Regina M. Sullivan, and Clancy Blair. 2019. "Enhancing Executive Functions Through Social Interactions: Causal Evidence Using a Cross-Species Model." *Frontiers in Psychology* 10: 2472. https://doi.org/10.3389/fpsyg.2019.02472.

Rainville, Constant, Emilie Lepage, Serge Gauthier, Marie-Jeanne Kergoat, and Sylvie Belleville. 2012. "Executive Function Deficits in Persons with Mild Cognitive Impairment: A Study with a Tower of London Task." *Journal of Clinical and Experimental Neuropsychology* 34, no. 3: 306–24. https://doi.org/10.1080/13803395.2011.639298.

Ranganathan, Priya, C. S. Pramesh, and Marc Buyse. 2015. "Common Pitfalls in Statistical Analysis: Clinical versus Statistical Significance." *Perspectives in Clinical Research* 6, no. 3: 169–70. https://doi.org/10.4103/2229-3485.159943.

Realdon, O., F. Rossetto, M. Nalin, I. Baroni, M. Cabinio, R. Fioravanti, F. L. Saibene, et al. 2016. "Technology-Enhanced Multi-Domain at Home Continuum of Care Program with Respect to Usual Care for People with Cognitive Impairment: The Ability-TelerehABILITation Study Protocol for a Randomized Controlled Trial." *BMC Psychiatry* 16, no. 1: 425. https://doi.org/10.1186/s12888-016-1132-y.

Reitan, R. M. 1958. "Validity of the Trail Making Test as an Indicator of Organic Brain Damage." *Perceptual and Motor Skills* 8: 271–76. https://doi.org/10.2466/PMS.8.7.271-276.

Rusticus, Shayna, and Chris Lovato. 2014. “Impact of Sample Size and Variability on the Power and Type I Error Rates of Equivalence Tests: A Simulation Study.” *Practical Assessment, Research and Evaluation* 19, no. January.

Ryan, Anna, Rose Hatala, Ryan Brydges, and Elizabeth Molloy. 2020. “Learning With Patients, Students, and Peers: Continuing Professional Development in the Solo Practitioner Workplace.” *The Journal of Continuing Education in the Health Professions* 40, no. 4: 283–88. https://doi.org/10.1097/CEH.0000000000000307.

Sánchez-Cubillo, I., J. A. Periáñez, D. Adrover-Roig, J. M. Rodríguez-Sánchez, M. Ríos-Lago, J. Tirapu, and F. Barceló. 2009. “Construct Validity of the Trail Making Test: Role of Task-Switching, Working Memory, Inhibition/Interference Control, and Visuomotor Abilities.” *Journal of the International Neuropsychological Society: JINS* 15, no. 3: 438–50. https://doi.org/10.1017/S1355617709090626.

Sandberg, Mark A. 2011. “Serial Subtractions.” In *Encyclopedia of Clinical Neuropsychology*, edited by Jeffrey S. Kreutzer, John DeLuca, and Bruce Caplan, 2267–68. New York, NY: Springer. https://doi.org/10.1007/978-0-387-79948-3_1328.

Seidler, Rachael D., Jessica A. Bernard, Taritonye B. Burutolu, Brett W. Fling, Mark T. Gordon, Joseph T. Gwin, Youngbin Kwak, and David B. Lipps. 2010. “Motor Control and Aging: Links to Age-Related Brain Structural, Functional, and Biochemical Effects.” *Neuroscience and Biobehavioral Reviews* 34, no. 5: 721–33. https://doi.org/10.1016/j.neubiorev.2009.10.005.

Shigekawa, Erin, Margaret Fix, Garen Corbett, Dylan H. Roby, and Janet Coffman. 2018. “The Current State Of Telehealth Evidence: A Rapid Review.” *Health Affairs (Project Hope)* 37, no. 12: 1975–82. https://doi.org/10.1377/hlthaff.2018.05132.

Silverstein, Merril, and Roseann Giarrusso. 2010. "Aging and Family Life: A Decade Review." *Journal of Marriage and Family* 72, no. 5: 1039–58. https://doi.org/10.1111/j.1741-3737.2010.00749.x.

Smith, Patrick J., Guy G. Potter, Molly E. McLaren, and James A. Blumenthal. 2013. "Impact of Aerobic Exercise on Neurobehavioral Outcomes." *Mental Health and Physical Activity* 6, no. 3: 139–53. https://doi.org/10.1016/j.mhpa.2013.06.008.

Stalvey, Beth T., Cynthia Owsley, Michael E. Sloane, and Karlene Ball. 1999. "The Life Space Questionnaire: A Measure of the Extent of Mobility of Older Adults." *Journal of Applied Gerontology* 18, no. 4: 460–78. https://doi.org/10.1177/073346489901800404.

Steinman, Michael A., Sei J. Lee, W. John Boscardin, Yinghui Miao, Kathy Z. Fung, Kelly L. Moore, and Janice B. Schwartz. 2012. "Patterns of Multimorbidity in Elderly Veterans." *Journal of the American Geriatrics Society* 60, no. 10: 1872–80. https://doi.org/10.1111/j.1532-5415.2012.04158.x.

Steptoe, Andrew, and Paola Zaninotto. 2020. "Lower Socioeconomic Status and the Acceleration of Aging: An Outcome-Wide Analysis." *Proceedings of the National Academy of Sciences* 117, no. June: 201915741. https://doi.org/10.1073/pnas.1915741117.

Stine-Morrow, Elizabeth A. L., Brennan R. Payne, Brent W. Roberts, Arthur F. Kramer, Daniel G. Morrow, Laura Payne, Patrick L. Hill, et al. 2014. "Training versus Engagement as Paths to Cognitive Enrichment with Aging." *Psychology and Aging* 29, no. 4: 891–906. https://doi.org/10.1037/a0038244.

Taylor, Kathryn L., Jackson L. Davis, Ralph O. Turner, Lenora Johnson, Marc D. Schwartz, Jon F. Kerner, and Chikarlo Leak. 2006. "Educating African American Men about the Prostate Cancer Screening Dilemma: A Randomized Intervention." *Cancer Epidemiology, Biomarkers &*

Prevention: A Publication of the American Association for Cancer Research, Cosponsored by the American Society of Preventive Oncology 15, no. 11: 2179–88. https://doi.org/10.1158/1055-9965.EPI-05-0417.

The New York Times. 2007. "Health Literacy Test," January 30, 2007, sec. Health. https://www.nytimes.com/2007/01/30/health/30brody-chart.html.

Tickle-Degnen, Linda. 2013. "Nuts and Bolts of Conducting Feasibility Studies." *The American Journal of Occupational Therapy: Official Publication of the American Occupational Therapy Association* 67, no. 2: 171–76. https://doi.org/10.5014/ajot.2013.006270.

Ukoli, Flora A., Kushal Patel, Margaret Hargreaves, Katina Beard, Pierre J. Moton, Richard Bragg, Derrick Beech, and Rodney Davis. 2013. "A Tailored Prostate Cancer Education Intervention for Low-Income African Americans: Impact on Knowledge and Screening." *Journal of Health Care for the Poor and Underserved* 24, no. 1: 311–31. https://doi.org/10.1353/hpu.2013.0033.

Valentine, Jeffrey C., and Cathleen M. McHugh. 2007. "The Effects of Attrition on Baseline Comparability in Randomized Experiments in Education: A Meta-Analysis." *Psychological Methods* 12, no. 3: 268–82. https://doi.org/10.1037/1082-989X.12.3.268.

Vaportzis, Eleftheria, Maria Giatsi Clausen, and Alan J. Gow. 2017. "Older Adults Perceptions of Technology and Barriers to Interacting with Tablet Computers: A Focus Group Study." *Frontiers in Psychology* 8, no. October: 1687. https://doi.org/10.3389/fpsyg.2017.01687.

Ware, J., M. Kosinski, and S. D. Keller. 1996. "A 12-Item Short-Form Health Survey: Construction of Scales and Preliminary Tests of Reliability and Validity." *Medical Care* 34, no. 3: 220–33. https://doi.org/10.1097/00005650-199603000-00003.

Williams, David R., Selina A. Mohammed, Jacinta Leavell, and Chiquita Collins. 2010. "Race, Socioeconomic Status, and Health: Complexities, Ongoing Challenges, and Research

Opportunities." *Annals of the New York Academy of Sciences* 1186, no. February: 69–101. https://doi.org/10.1111/j.1749-6632.2009.05339.x.

Willis, Sherry L., Sharon L. Tennstedt, Michael Marsiske, Karlene Ball, Jeffrey Elias, Kathy Mann Koepke, John N. Morris, et al. 2006. "Long-Term Effects of Cognitive Training on Everyday Functional Outcomes in Older Adults." *JAMA : The Journal of the American Medical Association* 296, no. 23: 2805–14. https://doi.org/10.1001/jama.296.23.2805.

Wolf, Michael S., Elizabeth A. H. Wilson, David N. Rapp, Katherine R. Waite, Mary V. Bocchini, Terry C. Davis, and Rima E. Rudd. 2009. "Literacy and Learning in Health Care." *Pediatrics* 124 Suppl 3, no. November: S275-281. https://doi.org/10.1542/peds.2009-1162C.

Wright, Daniel B., and Adriane Klumpp. 2004. "Collaborative Inhibition Is Due to the Product, Not the Process, of Recalling in Groups." *Psychonomic Bulletin & Review* 11, no. 6: 1080–83. https://doi.org/10.3758/BF03196740.

Yesavage, J. A., T. L. Brink, T. L. Rose, O. Lum, V. Huang, M. Adey, and V. O. Leirer. 1982. "Development and Validation of a Geriatric Depression Screening Scale: A Preliminary Report." *Journal of Psychiatric Research* 17, no. 1: 37–49. https://doi.org/10.1016/0022-3956(82)90033-4.

Zhou, Xiao, Federico J. A. Perez-Cueto, Quenia Dos Santos, Erminio Monteleone, Agnès Giboreau, Katherine M. Appleton, Thomas Bjørner, Wender L. P. Bredie, and Heather Hartwell. 2018. "A Systematic Review of Behavioural Interventions Promoting Healthy Eating among Older People." *Nutrients* 10, no. 2. https://doi.org/10.3390/nu10020128.

Appendix A

Assessment Sheets

Montreal Cognitive Assessment (MoCA)

Montreal Cognitive Assessment
(MoCA)

Administration and Scoring Instructions

The Montreal Cognitive Assessment (MoCA) was designed as a rapid screening instrument for mild cognitive dysfunction. It assesses different cognitive domains: attention and concentration, executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation. Time to administer the MoCA is approximately 10 minutes. The total possible score is 30 points; a score of 26 or above is considered normal.

1. Alternating Trail Making:

Administration: The examiner instructs the subject: *"Please draw a line, going from a number to a letter in ascending order. Begin here* [point to (1)] *and draw a line from 1 then to A then to 2 and so on. End here* [point to (E)]."

Scoring: Allocate one point if the subject successfully draws the following pattern:
1 −A- 2- B- 3- C- 4- D- 5- E, without drawing any lines that cross. Any error that is not immediately self-corrected earns a score of 0.

2. Visuoconstructional Skills (Cube):

Administration: The examiner gives the following instructions, pointing to the **cube**: "*Copy this drawing as accurately as you can, in the space below".*

Scoring: One point is allocated for a correctly executed drawing.
• Drawing must be three-dimensional
• All lines are drawn
• No line is added
• Lines are relatively parallel and their length is similar (rectangular prisms are accepted)

A point is not assigned if any of the above-criteria are not met.

3. Visuoconstructional Skills (Clock):

Administration: Indicate the right third of the space and give the following instructions: *"Draw a **clock**. Put in all the numbers and set the time to 10 past 11".*

Scoring: One point is allocated for each of the following three criteria:
• Contour (1 pt.): the clock face must be a circle with only minor distortion acceptable (e.g., slight imperfection on closing the circle);
• Numbers (1 pt.): all clock numbers must be present with no additional numbers; numbers must be in the correct order and placed in the approximate quadrants on the clock face; Roman numerals are acceptable; numbers can be placed outside the circle contour;
• Hands (1 pt.): there must be two hands jointly indicating the correct time; the hour hand must be clearly shorter than the minute hand; hands must be centred within the clock face with their junction close to the clock centre.

A point is not assigned for a given element if any of the above-criteria are not met.

4. Naming:

Administration: Beginning on the left, point to each figure and say: *"Tell me the name of this animal".*

Scoring: One point each is given for the following responses: (1) lion (2) rhinoceros or rhino (3) camel or dromedary.

5. Memory:

Administration: The examiner reads a list of 5 words at a rate of one per second, giving the following instructions*: "This is a memory test. I am going to read a list of words that you will have to remember now and later on. Listen carefully. When I am through, tell me as many words as you can remember. It doesn't matter in what order you say them"*. Mark a check in the allocated space for each word the subject produces on this first trial. When the subject indicates that (s)he has finished (has recalled all words), or can recall no more words, read the list a second time with the following instructions: *"I am going to read the same list for a second time. Try to remember and tell me as many words as you can, including words you said the first time."* Put a check in the allocated space for each word the subject recalls after the second trial.
At the end of the second trial, inform the subject that (s)he will be asked to recall these words again by saying, *"I will ask you to recall those words again at the end of the test."*

Scoring: No points are given for Trials One and Two.

6. Attention:

Forward Digit Span: Administration: Give the following instruction: "*I am going to say some numbers and when I am through, repeat them to me exactly as I said them*". Read the five number sequence at a rate of one digit per second.

Backward Digit Span: Administration: Give the following instruction: "*Now I am going to say some more numbers, but when I am through you must repeat them to me in the backwards order.*" Read the three number sequence at a rate of one digit per second.

Scoring: Allocate one point for each sequence correctly repeated, (*N.B.*: the correct response for the backwards trial is 2-4-7).

Vigilance: Administration: The examiner reads the list of letters at a rate of one per second, after giving the following instruction: "*I am going to read a sequence of letters. Every time I say the letter A, tap your hand once. If I say a different letter, do not tap your hand*".

Scoring: Give one point if there is zero to one errors (an error is a tap on a wrong letter or a failure to tap on letter A).

Serial 7s: Administration: The examiner gives the following instruction: *"Now, I will ask you to count by subtracting seven from 100, and then, keep subtracting seven from your answer until I tell you to stop."* Give this instruction twice if necessary.

Scoring: This item is scored out of 3 points. Give no (0) points for no correct subtractions, 1 point for one correction subtraction, 2 points for two-to-three correct subtractions, and 3 points if the participant successfully makes four or five correct subtractions. Count each correct subtraction of 7 beginning at 100. Each subtraction is evaluated independently; that is, if the participant responds with an incorrect number but continues to correctly subtract 7 from it, give a point for each correct subtraction. For example, a participant may respond "92 – 85 – 78 – 71 – 64" where the "92" is incorrect, but all subsequent numbers are subtracted correctly. This is one error and the item would be given a score of 3.

7. Sentence repetition:

Administration: The examiner gives the following instructions: *"I am going to read you a sentence. Repeat it after me, exactly as I say it* [pause]: ***I only know that John is the one to help today."*** Following the response, say: *"Now I am going to read you another sentence. Repeat it after me, exactly as I say it* [pause]: ***The cat always hid under the couch when dogs were in the room."***

Scoring: Allocate 1 point for each sentence correctly repeated. Repetition must be exact. Be alert for errors that are omissions (e.g., omitting "only", "always") and substitutions/additions (e.g., "John is the one who helped today;" substituting "hides" for "hid", altering plurals, etc.).

8. Verbal fluency:

Administration: The examiner gives the following instruction: *"Tell me as many words as you can think of that begin with a certain letter of the alphabet that I will tell you in a moment. You can say any kind of word you want, except for proper nouns (like Bob or Boston), numbers, or words that begin with the same sound but have a different suffix, for example, love, lover, loving. I will tell you to stop after one minute. Are you ready?* [Pause] *Now, tell me as many words as you can think of that begin with the letter F.* [time for 60 sec]. *Stop."*

Scoring: Allocate one point if the subject generates 11 words or more in 60 sec. Record the subject's response in the bottom or side margins.

9. Abstraction:

Administration: The examiner asks the subject to explain what each pair of words has in common, starting with the example: *"Tell me how an orange and a banana are alike".* If the subject answers in a concrete manner, then say only one additional time: *"Tell me another way in which those items are alike".* If the subject does not give the appropriate response *(fruit)*, say, *"Yes, and they are also both fruit."* Do not give any additional instructions or clarification. After the practice trial, say: *"Now, tell me how a train and a bicycle are alike".* Following the response, administer the second trial, saying: *"Now tell me how a ruler and a watch are alike".* Do not give any additional instructions or prompts.

Scoring: Only the last two item pairs are scored. Give 1 point to each item pair correctly answered. The following responses are acceptable:
Train-bicycle = means of transportation, means of travelling, you take trips in both;
Ruler-watch = measuring instruments, used to measure.
The following responses are **not** acceptable: Train-bicycle = they have wheels; Ruler-watch = they have numbers.

10. Delayed recall:

Administration: The examiner gives the following instruction: *"I read some words to you earlier, which I asked you to remember. Tell me as many of those words as you can remember."* Make a check mark (√) for each of the words correctly recalled spontaneously without any cues, in the allocated space.

Scoring: **Allocate 1 point for each word recalled freely without any cues.**

Optional:
Following the delayed free recall trial, prompt the subject with the semantic category cue provided below for any word not recalled. Make a check mark (√) in the allocated space if the subject remembered the word with the help of a category or multiple-choice cue. Prompt all non-recalled words in this manner. If the subject does not recall the word after the category cue, give him/her a multiple choice trial, using the following example instruction, *"Which of the following words do you think it was, NOSE, FACE, or HAND?"*
Use the following category and/or multiple-choice cues for each word, when appropriate:

FACE:	category cue: part of the body	multiple choice: nose, face, hand
VELVET:	category cue: type of fabric	multiple choice: denim, cotton, velvet
CHURCH:	category cue: type of building	multiple choice: church, school, hospital
DAISY:	category cue: type of flower	multiple choice: rose, daisy, tulip
RED:	category cue: a colour	multiple choice: red, blue, green

Scoring: **No points are allocated for words recalled with a cue.** A cue is used for clinical information purposes only and can give the test interpreter additional information about the type of memory disorder. For memory deficits due to retrieval failures, performance can be improved with a cue. For memory deficits due to encoding failures, performance does not improve with a cue.

11. Orientation:

Administration: The examiner gives the following instructions: "Tell me the date today". If the subject does not give a complete answer, then prompt accordingly by saying: *"Tell me the [year, month, exact date, and day of the week]."* Then say: *"Now, tell me the name of this place, and which city it is in."*

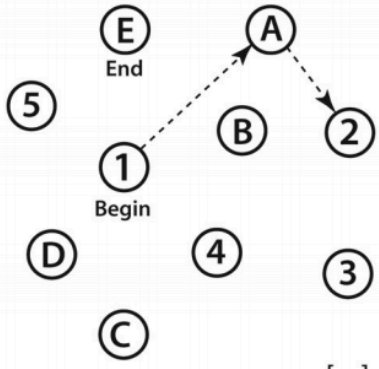
Scoring: Give one point for each item correctly answered. The subject must tell the exact date and the exact place (name of hospital, clinic, office). No points are allocated if subject makes an error of one day for the day and date.

TOTAL SCORE: Sum all subscores listed on the right-hand side. Add one point for an individual who has 12 years or fewer of formal education, for a possible maximum of 30 points. A final total score of 26 and above is considered normal.

MONTREAL COGNITIVE ASSESSMENT (MOCA)
Version 7.1 Original Version

NAME :
Education : Date of birth :
Sex : DATE :

VISUOSPATIAL / EXECUTIVE — POINTS



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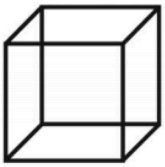


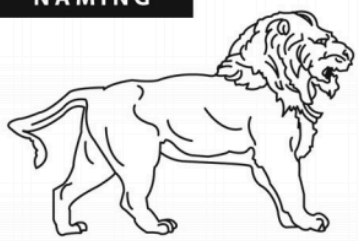
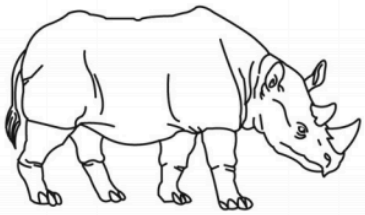
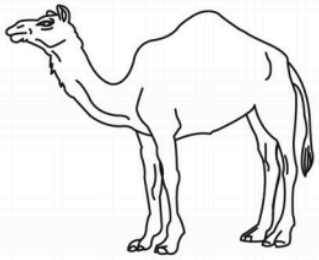
[ ] [ ]

Draw CLOCK (Ten past eleven) (3 points)

[ ] Contour [ ] Numbers [ ] Hands

__/5

NAMING

[ ] [ ] [ ]

__/3

MEMORY Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.

	FACE	VELVET	CHURCH	DAISY	RED
1st trial					
2nd trial					

No points

ATTENTION Read list of digits (1 digit/ sec.).
Subject has to repeat them in the forward order [ ] 2 1 8 5 4
Subject has to repeat them in the backward order [ ] 7 4 2

__/2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors
[ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B

__/1

Serial 7 subtraction starting at 100 [ ] 93 [ ] 86 [ ] 79 [ ] 72 [ ] 65
4 or 5 correct subtractions: **3 pts**, 2 or 3 correct: **2 pts**, 1 correct: **1 pt**, 0 correct: **0 pt**

__/3

LANGUAGE Repeat : I only know that John is the one to help today. [ ]
The cat always hid under the couch when dogs were in the room. [ ]

__/2

Fluency / Name maximum number of words in one minute that begin with the letter F [ ] _____ (N ≥ 11 words)

__/1

ABSTRACTION Similarity between e.g. banana - orange = fruit [ ] train – bicycle [ ] watch - ruler

__/2

DELAYED RECALL

	FACE	VELVET	CHURCH	DAISY	RED	Points for UNCUED recall only
Has to recall words **WITH NO CUE**	[ ]	[ ]	[ ]	[ ]	[ ]	
Optional Category cue						
Optional Multiple choice cue						

__/5

ORIENTATION [ ] Date [ ] Month [ ] Year [ ] Day [ ] Place [ ] City

__/6

www.mocatest.org

Normal ≥ 26 / 30

TOTAL __/30

Add 1 point if ≤ 12 yr edu

Administered by: _____

Tower of London (ToL)

Application

Test to measure planning ability in healthy individuals and in psychiatric and neurological patients.

Theoretical background

The term "planning ability" is used here to describe the ability to model solution possibilities cognitively and to assess the consequences of an action before it is carried out. The "Tower of London" dates back to an attempt by Shallice (1982) to devise a planning task that covers a broad difficulty spectrum and hence makes it possible to administer a large number of qualitatively different problems. The present version is based on the findings of recent studies of the connection between task complexity and the cognitive processes that underlie planning ability. Use of the TOL-F is recommended for various neurological disorders (e.g. frontal brain injury, neurodegenerative diseases) and psychiatric disorders (e.g. schizophrenia, compulsive disorders) in which planning ability is likely to be impaired.

Administration

The present test provides a detailed evaluation of planning ability and hence enables a precise assessment, which can be used as a basis for therapeutic intervention. Either the standard or the short form of the TOL-F can be used, depending on the reason for the investigation and the patient's ability level.

Test forms

There are two test forms. The first form is the standard form, which provides a detailed assessment of planning ability. The second form is a short form which discriminates mainly in the lower ability range; it therefore enables quick and economical measurement of performance deficits. Both the standard and the short forms of the TOL-F are available in three parallel versions.

Scoring

The main target variable is *planning ability* – i.e. the number of items worked correctly within a time limit of one minute each. Information on error types (such as systematic rule infringements or changes of mind while working the items) and on planning and execution times is reported.

Reliability

The test's reliability was estimated from the data of the norm sample. Cronbach's Alpha and other measures of reliability for planning ability as the main variable are >0.7 and thus – bearing in mind the broad range of different item difficulties combined with the relatively short test duration – are entirely satisfactory.

Validity

Extensive literature supports the validity of the test implemented here. Variants of the "Tower of London" had already been used with numerous neurological and psychiatric patient groups and with healthy adults and children. The present variant is based on a number of recent studies of the psychometric properties of the "Tower of London".

Trails Making Test (TMT)

Instructions for Trail Making test:

Part A

Sample A: "There are numbers in circles on this page. Please take the pencil and draw a line from one number to the next, in order. Start at 1 [point to the number], then go to 2 [point], then go to 3 [point], and so on. Please try not to lift the pen as you move from one number to the next. Work as quickly and accurately as you can."

If there is an error: "You were at number 2. What is the next number?" Wait for the subject's response and say, "please start here and continue."

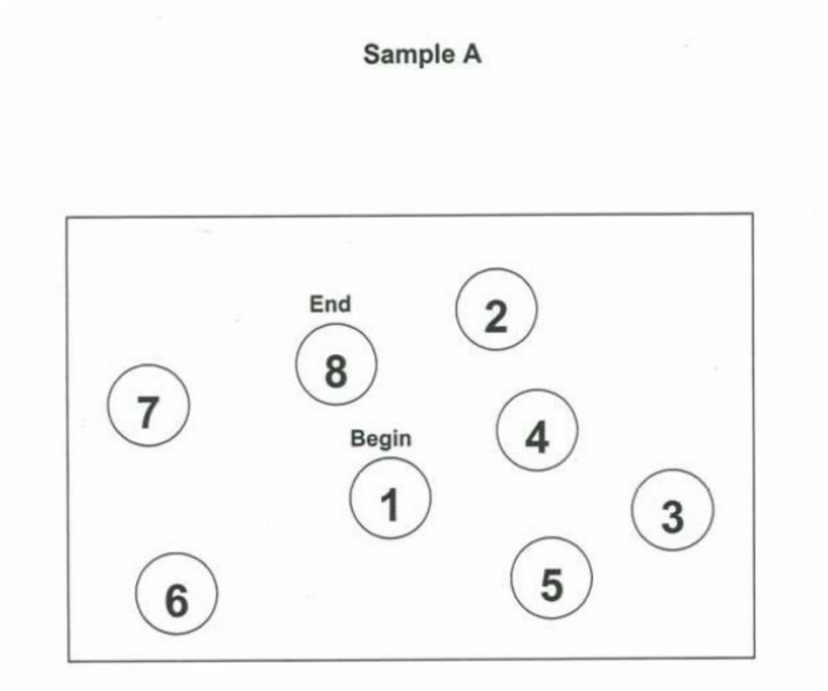
Test A: If Sample A is completed correctly. Repeat the above instructions. Start timing as soon as the instruction id given to begin. Stop timing when the Trail is completed, or when maximum time is reached (150 seconds = 2.5 min).

Part B

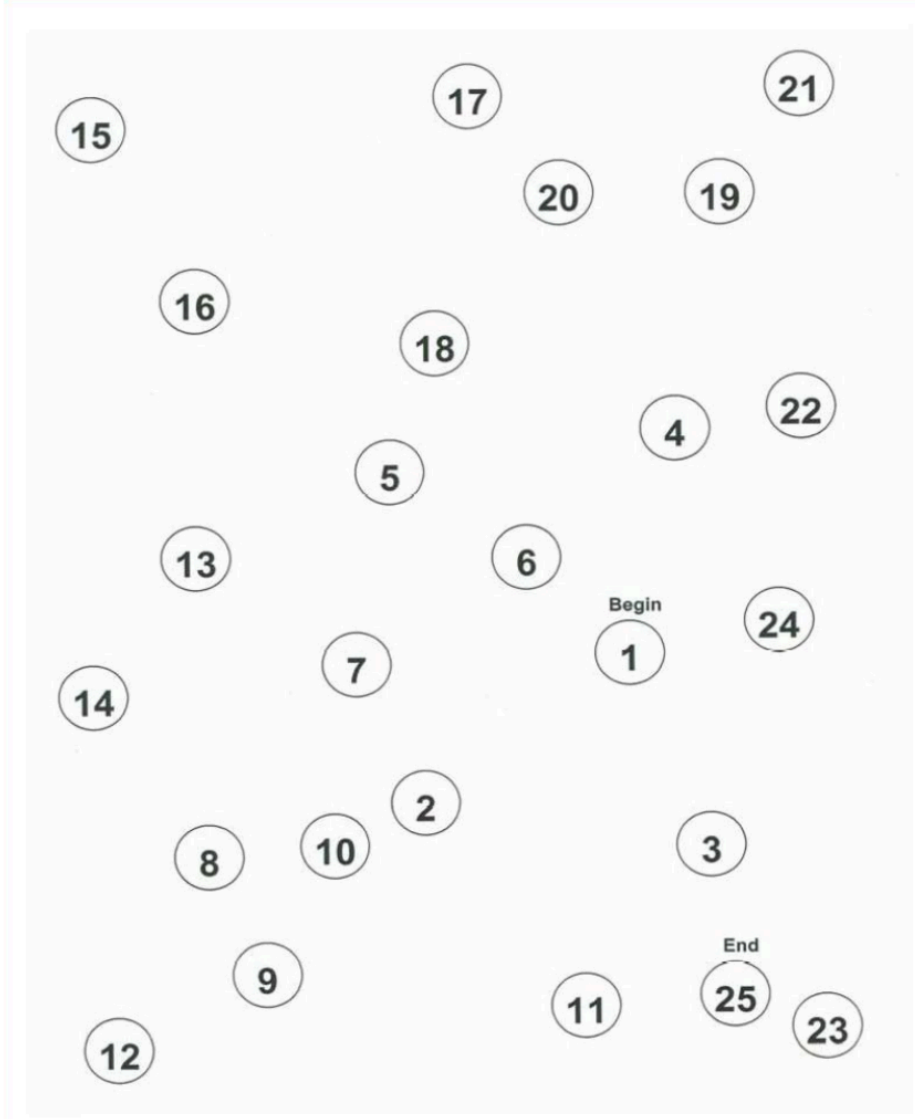
Sample B: "There are numbers and letters in circles on this page. Please take the pen and draw a line, alternating in order between the numbers and letters. Start at number 1 [point], then go to the first letter, A [point], then go to the next number, 2 [point], and then the next letter, B [point], and so on. Please try not to lift the pen as you move from one number or letter to the next. Work as quickly and accurately as you can."

If there is an error: "You were at number 2. What is the next letter?" Wait for the subject's response and say, "please start here and continue."

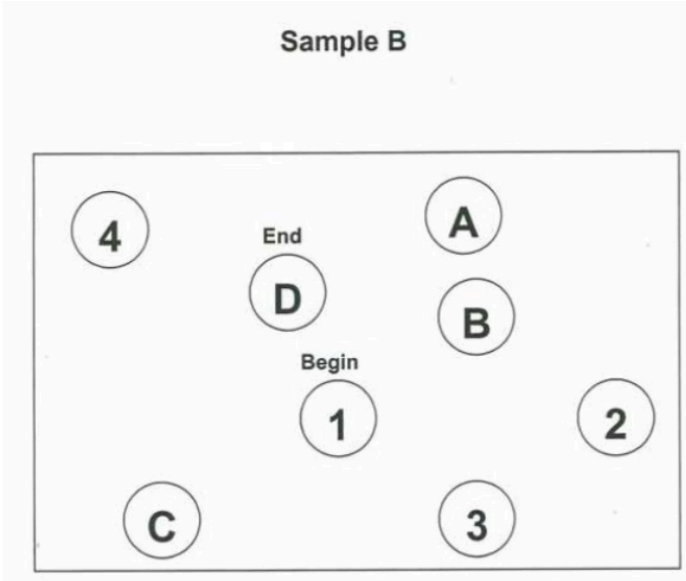
Test B: If Sample B is completed correctly. Repeat the above instructions. Start timing as soon as the instruction id given to begin. Stop timing when the Trail is completed, or when maximum time is reached (300 seconds = 5 min).



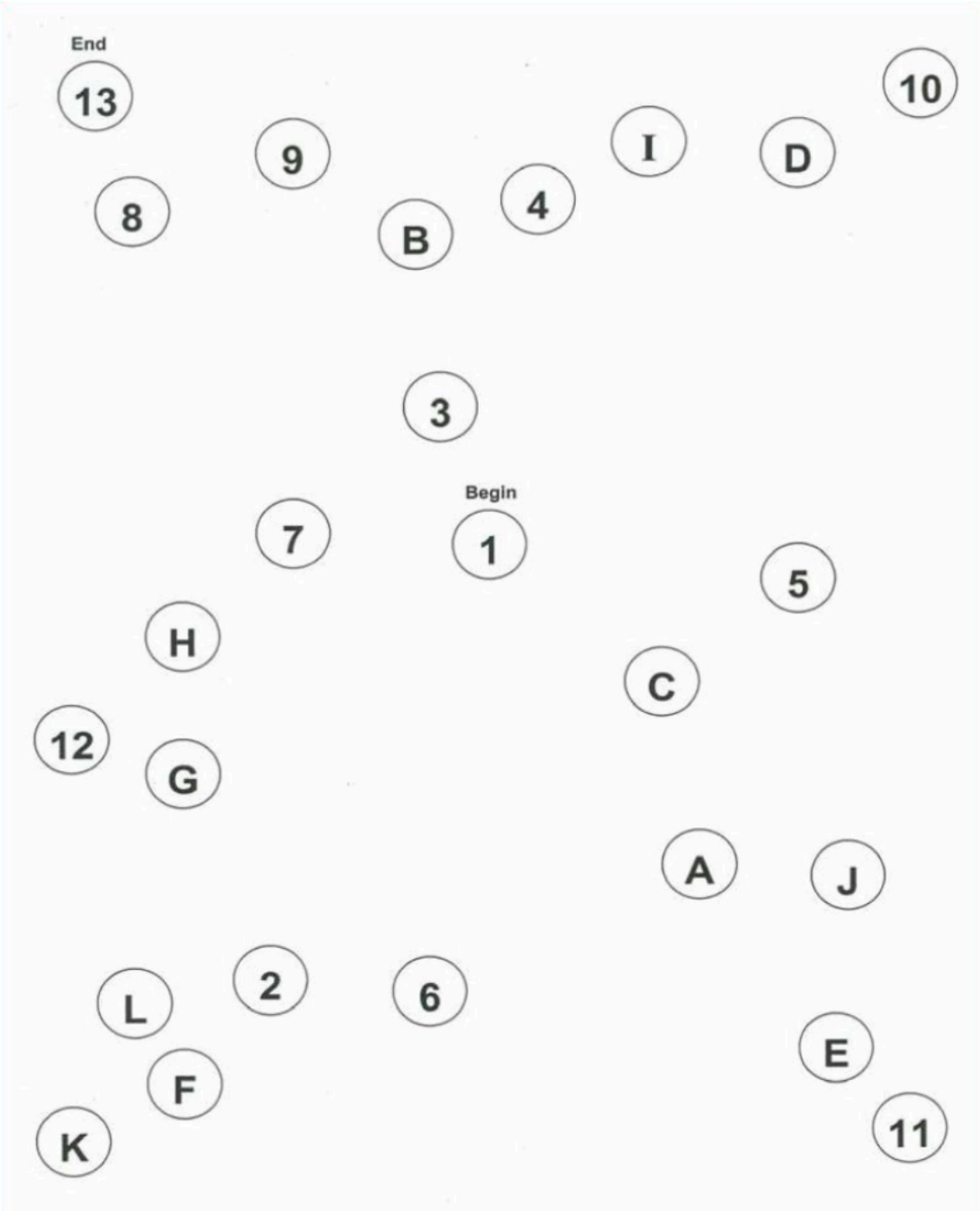
Test A



Sample B



Test B



Color-Word Interference Test (CWIT)

D-KEFS Color-Word Interference Test

Ages 8–89
Materials: Record Form, Stimulus Booklet (Flat Position), Stopwatch

Condition 1: Color Naming

Discontinue

Discontinue if the examinee has marked difficulty or makes four uncorrected errors on the practice lines. Otherwise, discontinue the score task after 90 seconds.

Administration and Recording

Place the stimulus booklet flat on the table in a horizontal (landscape) position directly in front of the examinee so that the two practice lines of Condition 1 are positioned at the top of the page from the examinee's perspective. Say,

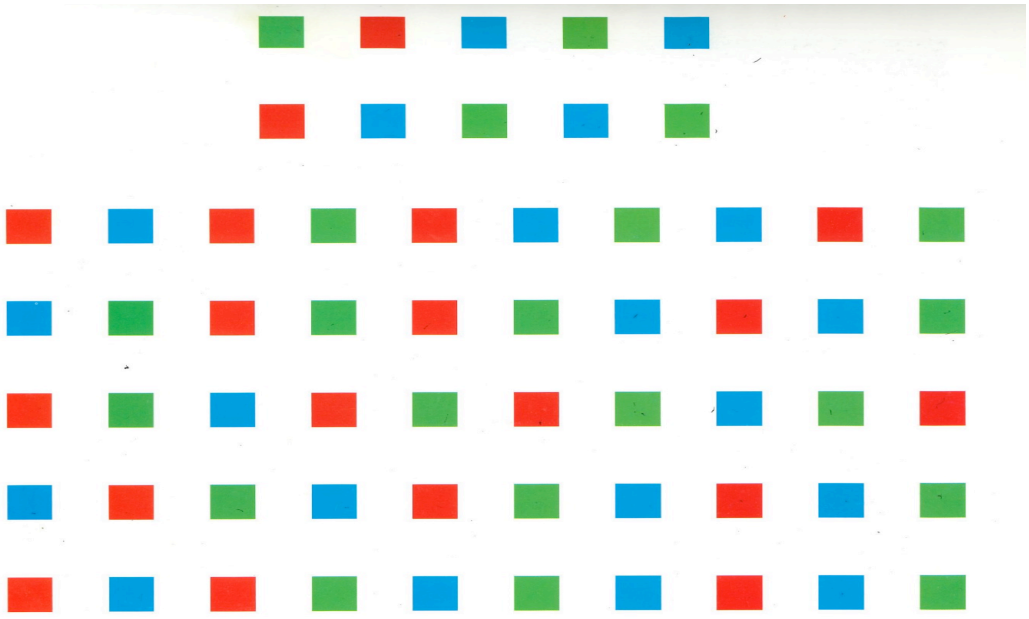
> This page has patches of color on it. I'd like you to say the colors as quickly as you can without skipping any or making mistakes. When you finish this line (sweep across the first practice line of five squares with your finger), go on to this one (point to the first square of the second row). Now try these first two lines for practice.

If the examinee is able to complete the two practice lines, say, Good. Now, when I say begin, I want you to say the rest of the colors. Begin here (point to the first square on the first line of 10 squares below the practice lines) and say each color, one after the other, without skipping any. When you finish this line (sweep across the first row with your finger), go on to this one (point to the first squar of the second row). Keep saying the colors until you reach the end of the last line (point). Say the colors as quickly as you can without making mistakes. Ready? Begin.

Start timing. Follow the examinee's progress item by item. Record errors by writing the first letter of the incorrect color name beneath the correct response and record any nonsense words (e.g., "bleen") verbatim. Indicate self-corrections by drawing a slash mark through the letter or word. Record total completion time in seconds.

Allow the examinee to use a finger to maintain his or her place on the stimulus page. If the examinee skips a line accidentally, point out the error immediately and redirect the examinee to the correct line. Keep the stopwatch running while pointing out line-skipping errors.

If the examinee does not complete the task at the end of 90 seconds, say, Stop. Indicate the last item attempted and record 90 seconds as the total completion time. Items to which the examinee did not respond because the time limit was reached are not counted as errors. Turn the page in the stimulus booklet to Condition 2: Word Reading.



Condition 1: Color Naming

Total Uncorrected Errors	Total Self-Corrected Errors	Total Time To Complete

D-KEFS Color-Word Interference Test *(continued)*

Condition 2: Word Reading

Discontinue

Discontinue if the examinee has marked difficulty or makes four uncorrected errors on the two practice lines. Otherwise, discontinue the scored task after 90 seconds.

Administration and Recording

Place the stimulus booklet flat on the table in a horizontal (landscape) position directly in front of the examinee, with the rows of words printed in black ink facing the examinee. Say,

> Now look at this page with words printed on it. I'd like you to read the words aloud as quickly as you can without skipping any or making mistakes. When you finish this line (sweep across the first practice line of five words with your finger), go on to this one (point to the first word of the second row). Now try reading these first two lines for practice.

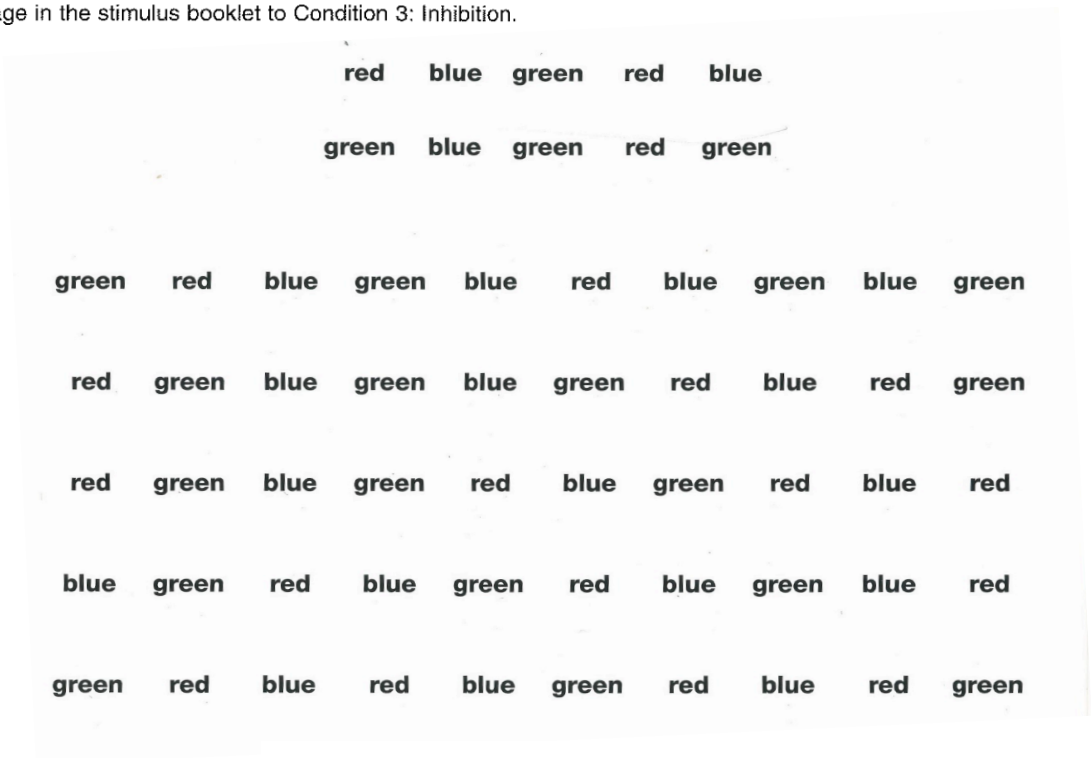
If the examinee is able to complete the two practice lines, say,

> Good. Now, when I say begin, I want you to read the rest of the words. Begin here (point to the first word on the first line of 10 words below the practice lines) and read each word, one after the other, without skipping any. Keep reading the words until you reach the end (point to the last word on the last line). Read the words as quickly as you can without making mistakes. Ready? Begin.

Start timing. Follow the examinee's progress item by item. Record errors by writing the first letter of the incorrect word beneath the correct response and record any nonsense words (e.g., "bleen") verbatim. Indicate self-corrections by drawing a slash mark through the letter or word. Record total completion time in seconds.

Allow the examinee to use a finger to maintain his or her place on the stimulus page. If the examinee skips a line accidentally, point out the error immediately and redirect the examinee to the correct line. Keep the stopwatch running while pointing out line-skipping errors.

If the examinee does not complete the task at the end of 90 seconds, say, Stop. Indicate the last item attempted and record 90 seconds as the total completion time. Items to which the examinee did not respond because the time limit was reached are not counted as errors. Turn the page in the stimulus booklet to Condition 3: Inhibition.



Condition 2: Word Reading

Total Uncorrected Errors	Total Self-Corrected Errors	Total Time To Complete

D-KEFS Color-Word Interference Test *(continued)*

Condition 3: Inhibition

Discontinue

Discontinue if the examinee has marked difficulty or requires four corrections on the two practice lines. Otherwise, discontinue the scored task after 180 seconds.

Administration and Recording

Place the stimulus booklet flat on the table in a horizontal (landscape) position directly in front of the examinee, with the rows of words printed in dissonant ink colors facing the examinee. Say,

> Now look at this page. It's going to be a little harder than the other pages because the color names are printed in a different-colored ink. For example (point to the first word on the first practice line of five words), do you see how the word *red* is printed in *green* ink here? This time, you are to name *the color of the ink* that the letters are printed in and *not read the word*. So, what would you say for this one? (Point again to the first word on the first practice line and allow the examinee to respond. Correct any errors.) Good. And this one? (Point to the next two practice items. Correct any errors.) Good. Now try these first two lines for practice.

If the examinee has difficulty understanding the task, you may demonstrate it by naming the ink colors on the first practice line, then inviting the examinee to respond to the second line. If the examinee requires four corrections on the two practice lines, discontinue this condition and do not administer Condition 4: Inhibition/Switching.

If the examinee is able to complete the two practice lines, say,

> Good. Now, when I say begin, I want you to do the same thing for the rest of them. Say the color of the ink the letters are printed in; do not read the words. Begin here (point to the first word on the first line of 10 words below the practice lines) and say each ink color, one after the other, without skipping any. Keep saying the ink colors until you reach the end (point to the last word of the last line). Say the ink colors as quickly as you can without making mistakes. Ready? Begin.

Start timing. Follow the examinee's progress item by item. The single letter (*r* for red, *b* for blue, *g* for green) printed in parentheses next t each correct response represents the error response if the examinee reads the word rather than naming the ink color. Record errors by circling the letter or by writing the initial letter of other incorrect colors beneath the correct response. Also record any nonsense words (e.g., "bleen") verbatim. Indicate self-corrections by drawing a slash through the letter or word. Record total completion time in seconds.

Allow the examinee to use a finger to maintain his or her place on the stimulus page. If the examinee skips a line accidentally, point out the error immediately and redirect the examinee to the correct line. Keep the stopwatch running while pointing out line-skipping errors.

If the examinee makes three consecutive errors of reading the words, prompt him or her to name the ink color. Provide this prompt only once during this condition and keep the stopwatch running.

If the examinee does not complete the task at the end of 180 seconds, say, Stop. Indicate the last item attempted and record 180 seco as the total completion time. Items to which the examinee did not respond because the time limit was reached are not counted as errors. Turn the page in the stimulus booklet to Condition 4: Inhibition/Switching.

Rule:
Name the ink color.

red blue green blue green

red blue red green red

blue green blue red blue red blue red blue red

blue green blue green red green blue red blue green

red green red blue green red green red blue green

blue green blue red green blue red green red green

green blue red blue green red blue green red blue

Condition 3: Inhibition

Total Uncorrected Errors	Total Self-Corrected Errors	Total Time To Complete

D-KEFS Color-Word Interference Test *(continued)*

Condition 4: Inhibition/Switching

Discontinue

Do not administer Condition 4 if the examinee had marked difficulty or did not finish before the time limit was reached on Condition 3: Inhibition. Discontinue if the examinee has marked difficulty or requires four corrections on the practice lines of Condiditon 4. Otherwise, discontinue the scored task after 180 seconds.

Administration and Recording

Place the stimulus booklet flat on the table in a horizontal (landscape) position directly in front of the examinee, with the rows of words printed in dissonant ink colors, half of which are contained in rectangles, facing the examinee. Say,

> This is the fourth and last page. This time, for many of the words, you are to do the same thing you just did: Name the color of the ink and do not read the words. But if a word is inside a little box, you should read the word and not name the ink color. (Point to the first three items in the first practice line of five words.) For example, what would you say for these first three words? (Allow the examinee to respond and provide corrections if necessary.) Good. Now try these first two lines for practice.

If the examinee has difficulty understanding the task, you may demonstrate it by responding to the items on the first practice line, then inviting the examinee to respond to the second line. If the examinee requires four corrections on the two practice lines, discontinue this condition. If the examinee is able to complete the practice lines, say,

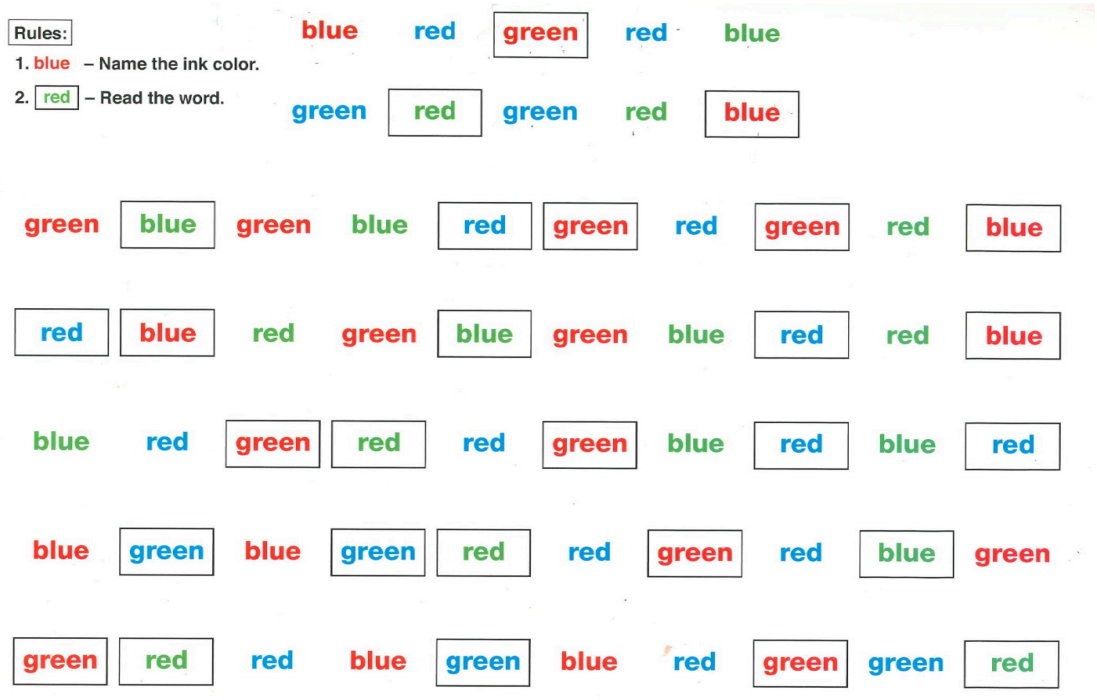
> Very good. Now, when I say begin, I want you to do the same thing for the rest of them. Say the color of the ink the letters are printed in or read the word if it is in a box. Begin here (point to the first word on the first line of 10 words below the practice lines) and keep going until you reach the end (point to the last word of the last line). Say the ink colors or words as quickly as you can without making mistakes. Ready? Begin.

Start timing. Follow the examinee's progress item by item. The single letter (*r* for red, *b* for blue, *g* for green) printed in parentheses next to each correct response represents the error response if the examinee either (a) reads the word rather than naming the ink color for an item not contained in a rectangle or (b) names the ink color rather than reading the word for an item contained in a rectangle. Record errors by circling the letter or by writing the initial letter of other incorrect colors beneath the correct response. Also record any nonsense words (e.g., "bleen") verbatim. Indicate self-corrections by drawing a slash through the letter or word. Record total completion time in seconds.

Allow the examinee to use a finger to maintain his or her place on the stimulus page. If the examinee skips a line accidentally, point out the error immediately and redirect the examinee to the correct line. Keep the stopwatch running while pointing out line-skipping errors.

If the examinee makes three consecutive errors, prompt him or her either to name the ink color or to read the word in the rectangle. Provide this prompt only once during this condition and keep the stopwatch running.

If the examinee does not complete the task at the end of 180 seconds, say, Stop. Indicate the last item attempted and record 180 seconds as the total completion time. Items to which the examinee did not respond because the time limit was reached are not counted as errors.



Condition 4: Inhibition/Switching

Total Uncorrected Errors	Total Self-Corrected Errors	Total Time To Complete

Reverse Corsi Blocks Visuospatial Task

REVERSE CORSI BLOCKS

Tell the participant: *"I am going to point to a series of blocks in a certain order. When I am done you should repeat what I just did BACKWARDS. You will point to the same blocks in reverse order. For example, if I pointed to these blocks…*

- Point to blocks 1-6 in that order, moving slowly enough that the participant can follow

"What would you do? Do you have any questions?"

STOP testing after two consecutive failures on the same level

BACKWARD CORSI BLOCKS

LEVEL		Trial 1	Trial 2
Practice	a) 1-6		
1	a) 9-4 b) 1-9		
2	a) 1-5-6 b) 5-7-2		
3	a) 8-4-3-8 b) 9-6-5-4		
4	a) 2-4-5-7-3 b) 4-8-2-5-6		
5	a) 2-4-5-9-3-7 b) 8-1-5-2-3-7		
6	a) 4-9-2-8-5-6-3 b) 7-4-8-1-2-5-6		
7	a) 4-6-9-3-5-2-1-7 b) 7-5-2-8-6-4-1-3		
8	a) 6-1-3-2-7-4-8-5-9 b) 1-8-4-9-6-7-3-2-5		
	# levels completed =		

← Put a checkmark if the participant points to the blocks correctly.

HIGHEST LEVEL ACHIEVED: _____ (largest level # where the participant got any of the trials correct)

TOTAL TRIALS: _____ (add up all the correct trials)

SPAN = _____ (HIGHEST LEVEL ACHIEVED plus 1)

Timed Up & Go Test* (TUG) & *Serial 3 Subtractions

Timed Up and Go ***NOTE* If participant uses an assistive device, Please note.**

a. Practice TUG _____(s) **b. TIMED UP & GO - baseline** _____(s)

c. TIMED UP & GO – cognitive counting backward by threes: randomly selected number between 20 and 100. First, allow the subject to practice in sitting. Select a different starting number for the walking trial. * Record *seated practice* for 15 sec x 3 trials. Record:

Starting #:

1. ____||_____ **E__C__**
2. ____||_____ **E__C__**
3. ____||_____ **E__C__**

Instructions: "Count backwards by 3's starting from XX (between 20-100) while walking as quickly and safely as you can. Cross the tape and turn around. Walk back to the chair, and sit down. Pay equal attention to both walking and counting." * Record

RESPONSE (numbers) _____

Cognitive Timed Up & Go :_____(seconds) # correct: _____# of errors: _____

d. TIMED UP & GO – manual: carrying a full cup of water (5 cm from top). Place table beside chair on side of hand the participant prefers to carry the glass with.

Instructions: "Stand up and pick up the glass of water. Carry the glass while walking as quickly and safely as you can. Cross the tape and turn around. Walk back to the chair, place the glass on the table and sit down."

Manual Timed Up & Go :_____(s)

Body Position Spatial Task (BPST)

_____ Body Position Spatial Task DATE___/____/_____ RATER _____

Tell participant, "**This is the Body Position Task. I will demonstrate, tell you and guide you in a series of walking steps and turns in a certain order. When I am done, you should repeat EXACTLY what I just did. In other words, you will do the same pattern of steps and turns in the SAME order. Think about it like driving directions. Do you have any questions?"**

1. Once you have answered the subject's questions, say, "**OK, then here is the first pattern**." Begin with the answer sheet for the Forward version of Body position task.
    a. Perform the steps and turns in the order listed on the answer sheet for Trial 1 of Level 1. Demonstrate and verbally describe steps at a constant rate of about one movement per every 2 seconds.
    a. Pause for about 10 seconds to allow subject to respond.
        i. If subject gets the ENTIRE pattern CORRECT, put a 1 in the response column.
        ii. If subject gets ANY part of the pattern INCORRECT, put a 0 in the response column.
    b. Administer TRIAL 2 of LEVEL 1 in the same way.

2. Continue advancing to the next level if the subject gets AT LEAST ONE of the trials in a level CORRECT. **ALWAYS** give subject **BOTH** trials of a particular level.
3. If the subject gets BOTH trials of a level INCORRECT, end this task and move on to the BACKWARD version of Body Position Spatial Memory Span Task.

BPSWM Scoring

LEVEL		Trial 1	Trial 2
1	a) Forward step; Turn Right = **2 moves** b) Step Left; Turn Right		
2	a) Forward step; Turn Left; Forward step = **3 moves** b) Turn Right; Step Right; Forward step		
3	a) Forward step; Turn Right; Step Left; Forward step= **4 moves** b) Turn Right; Forward step; Turn Left; Step Left		
4	a) Forward step; Turn Left; Forward step; Step Left; Turn Left= **5 moves** b) Turn Left; Forward step; Turn Right; Step R; Forward step		
5	a) Step right; Forward step; Turn Right; Turn Right; Forward step; Turn Left = **6 moves** b) Forward step; Turn Right: Step Left; Forward step; Step Left; Turn Left		
6	a) Forward step; Step right; Forward step; Turn Left; Forward step; Turn Right; Forward step = **7 moves** b) Turn Left; Step Left; Turn Right; Forward step; Turn Left; Forward step; Step right		
7	a) Forward step; Step Left; Forward step; Step right; Forward step; Turn Left; Forward step; Step Left = **8 moves** b) Forward step; Turn Right; Step right; Turn Right; Step Left; Forward step; Step right; Turn Right		
8	**a)** Forward step; Turn Right; Turn Left; Forward step; Turn Right; Forward step; Turn Left; Step right; Turn Left = **9 moves** b) Step Left; Forward step; Step right; Turn Right; Step right; Forward step; Turn Right; Step Left; Forward step		
	# Levels completed = SPAN= levels +1 = Total		
	TOTAL TRIALS = # correct trial 1 +trial 2		

Rapid Estimate of Adult Literacy in Medicine **(REALM)**

REALM Health Literacy Test
(Rapid Estimate of Adult Literacy in Medicine)

How many of these words can you read aloud and pronounce correctly, each within five seconds? Start with the first column, reading down. Skip those you cannot read.

Fat	Fatigue	Allergic
Flu	Pelvic	Menstrual
Pill	Jaundice	Testicle
Dose	Infection	Colitis
Eye	Exercise	Emergency
Stress	Behavior	Medication
Smear	Prescription	Occupation
Nerves	Notify	Sexually
Germs	Gallbladder	Alcoholism
Meals	Calories	Irritation
Disease	Depression	Constipation
Cancer	Miscarriage	Gonorrhea
Caffeine	Pregnancy	Inflammatory
Attack	Arthritis	Diabetes
Kidney	Nutrition	Hepatitis
Hormones	Menopause	Antibiotics
Herpes	Appendix	Diagnosis
Seizure	Abnormal	Potassium
Bowel	Syphilis	Anemia
Asthma	Hemorrhoids	Obesity
Rectal	Nausea	Osteoporosis
Incest	Directed	Impetigo

SCORE

Add up the number of words pronounced correctly.

0—18 words ***Third grade or below*** You will not be able to read easy materials. You will need repeated oral instructions, materials composed primarily of illustrations, or audio or videotapes,

19—44 words ***Fourth to sixth grade*** You will need easy materials. You will not be able to read prescription labels.

45—60 words ***Seventh to eighth grade*** You will struggle with most patient education materials and will not be offended by low-literacy materials.

61—66 words ***High school*** You will be able to read most patient-education materials

Source: Rapid Estimate.of Adult Literacy in Medicine
The New York Times

Short Test of Functional Health Literacy for Adults **(S-TOFHLA)**

Short Test of Functional Literacy in Adults
STOFHLA
READING COMPREHENSION

HAND PATIENT THE READING COMPREHENSION PASSAGES TO BE COMPLETED. FOLD BACK THE PAGE OPPOSITE THE TEXT SO THAT THE PATIENT SEES ONLY THE TEXT.

PREFACE THE READING COMPREHENSION EXERCISE WITH:

> "Here are some other medical instructions that you or anybody might see around the hospital. These instructions are in sentences that have some of the words missing. Where a word is missing, a blank line is drawn, and 4 possible words that could go in the blank appear just below it. I want you to figure out which of those 4 words should go in the blank, which word makes the sentence make sense. When you think you know which one it is, circle the letter in front of that word, and go on to the next one. When you finish the page, turn the page and keep going until you finish all the pages."

STOP AT THE END OF 7 MINUTES

PASSAGE A: X-RAY PREPARATION

PASSAGE B: MEDICAID RIGHTS AND RESPONSIBILITIES

A1	(1)	(0)
a.		
b.		
c.		
d.		

A2	(1)	(0)
a.		
b.		
c.		
d.		

A3	(1)	(0)
a.		
b.		
c.		
d.		

A4	(1)	(0)
a.		
b.		
c.		
d.		

A5	(1)	(0)
a.		
b.		
c.		
d.		

Sub-Total

PASSAGE A

Your doctor has sent you to have a _____ X-ray.

a. stomach
b. diabetes
c. stitches
d. germs

You must have an _____ stomach when you come for _____.

a. asthma
b. empty
c. incest
d. anemia

a. is.
b. am.
c. if.
d. it.

The X-ray will _____ from 1 to 3 _____ to do.

a. take
b. view
c. talk
d. look

a. beds
b. brains
c. hours
d. diets

A6	(1)	(0)	A7	(1)	(0)
a.			a.		
b.			b.		
c.			c.		
d.			d.		

A8	(1)	(0)	A9	(1)	(0)
a.			a.		
b.			b.		
c.			c.		
d.			d.		

A10	(1)	(0)	A11	(1)	(0)
a.			a.		
b.			b.		
c.			c.		
d.			d.		

Sub-Total

THE DAY BEFORE THE X-RAY.

For supper have only a _____ snack of fruit, _____ and jelly,

a. little	a. toes
b. broth	b. throat
c. attack	c. toast
d. nausea	d. thigh

with coffee or tea.

After _____ , you must not _____ or drink

a. minute,	a. easy
b. midnight,	b. ate
c. during,	c. drank
d. before,	d. eat

anything at _____ until after you have _____ the X-ray.

a. ill	a. are
b. all	b. has
c. each	c. had
d. any	d. was

A12	(1)	(0)
a.		
b.		
c.		
d.		

A13	(1)	(0)
a.		
b.		
c.		
d.		

A14	(1)	(0)
a.		
b.		
c.		
d.		

A15	(1)	(0)
a.		
b.		
c.		
d.		

A16	(1)	(0)
a.		
b.		
c.		
d.		

Sub-Total

THE DAY OF THE X-RAY.

Do not eat _____.

a. appointment.
b. walk-in.
c. breakfast.
d. clinic.

Do not _____, even _____.

a. drive,	a. heart.
b. drink,	b. breath.
c. dress,	c. water.
d. dose,	d. cancer.

If you have any _____, call the X-ray _____ at 616-4500.

a. answers,	a. Department
b. exercises,	b. Sprain
c. tracts,	c. Pharmacy
d. questions,	d. Toothache

B17	(1)	(0)
a.		
b.		
c.		
d.		

B18	(1)	(0)
a.		
b.		
c.		
d.		

B19	(1)	(0)
a.		
b.		
c.		
d.		

B20	(1)	(0)
a.		
b.		
c.		
d.		

B21	(1)	(0)
a.		
b.		
c.		
d.		

B22	(1)	(0)
a.		
b.		
c.		
d.		

B23	(1)	(0)
a.		
b.		
c.		
d.		

Sub-Total

PASSAGE B

I agree to give correct information to _____ if I can receive Medicaid.

a. hair
b. salt
c. see
d. ache

I _____ to provide the county information to _____ any

a. agree
b. probe
c. send
d. gain

a. hide
b. risk
c. discharge
d. prove

statements given in this _____ and hereby give permission to

a. emphysema
b. application
c. gallbladder
d. relationship

the _____ to get such proof. I _____ that for

a. inflammation
b. religion
c. iron
d. county

a. investigate
b. entertain
c. understand
d. establish

Medicaid I must report any _____ in my circumstances

a. changes
b. hormones
c. antacids
d. charges

B24	(1)	(0)
a.		
b.		
c.		
d.		

B25	(1)	(0)
a.		
b.		
c.		
d.		

B26	(1)	(0)
a.		
b.		
c.		
d.		

B27	(1)	(0)
a.		
b.		
c.		
d.		

B28	(1)	(0)
a.		
b.		
c.		
d.		

B29	(1)	(0)
a.		
b.		
c.		
d.		

B30	(1)	(0)
a.		
b.		
c.		
d.		

B31	(1)	(0)
a.		
b.		
c.		
d.		

B32	(1)	(0)
a.		
b.		
c.		
d.		

Sub-Total

within _____ (10) days of becoming _____ of the change.

a. three	a. award
b. one	b. aware
c. five	c. away
d. ten	d. await

I understand _____ if I DO NOT like the _____ made on my

a. thus	a. marital
b. this	b. occupation
c. that	c. adult
d. than	d. decision

case, I have the _____ to a fair hearing. I can _____ a

a. bright	a. request
b. left	b. refuse
c. wrong	c. fail
d. right	d. mend

hearing by writing or _____ the county where I applied.

a. counting
b. reading
c. calling
d. smelling

If you _____ TANF for any family _____ , you will have to

a. wash	a. member,
b. want	b. history,
c. cover	c. weight,
d. tape	d. seatbelt,

B33 (1) (0)	B34 (1) (0)
a.	a.
b.	b.
c.	c.
d.	d.

B35 (1) (0)	B36 (1) (0)
a.	a.
b.	b.
c.	c.
d.	d.

READING COMPREHENSION RAW SCORE

Sub-Total

_____ a different application form. _____, we will use

a. relax
b. break
c. inhale
d. sign

a. Since,
b. Whether,
c. However,
d. Because,

the _____ on this form to determine your _____ .

a. lung
b. date
c. meal
d. pelvic

a. hypoglycemia.
b. eligibility.
c. osteoporosis.
d. schizophrenia.

Beck Depression Inventory-II **(BDI-II)**

Roche | **Beck Depression Inventory** | **Baseline**

V 0477 | CRTN: _____ CRF number: _____ | Page 14 | patient inits: _____

The BDI-II contains 21 questions, each answer being scored on a scale value of 0 to 3. The cutoffs used differ from the original: 0–13: minimal depression; 14–19: mild depression; 20–28: moderate depression; and 29–63: severe depression. Higher total scores indicate more severe depressive symptoms.

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past two weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Pattern) or Item 18 (Changes in Appetite).

1. Sadness
- 0 I do not feel sad.
- 1 I feel sad much of the time.
- 2 I am sad all the time.
- 3 I am so sad or unhappy that I can't stand it.

2. Pessimism
- 0 I am not discouraged about my future.
- 1 I feel more discouraged about my future than I used to be.
- 2 I do not expect things to work out for me.
- 3 I feel my future is hopeless and will only get worse.

3. Past Failure
- 0 I do not feel like a failure.
- 1 I have failed more than I should have.
- 2 As I look back, I see a lot of failures.
- 3 I feel I am a total failure as a person.

4. Loss of Pleasure
- 0 I get as much pleasure as I ever did from the things I enjoy.
- 1 I don't enjoy things as much as I used to.
- 2 I get very little pleasure from the things I used to enjoy.
- 3 I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings
- 0 I don't feel particularly guilty.
- 1 I feel guilty over many things I have done or should have done.
- 2 I feel quite guilty most of the time.
- 3 I feel guilty all of the time.

6. Punishment Feelings
- 0 I don't feel I am being punished.
- 1 I feel I may be punished.
- 2 I expect to be punished.
- 3 I feel I am being punished.

7. Self-Dislike
- 0 I feel the same about myself as ever.
- 1 I have lost confidence in myself.
- 2 I am disappointed in myself.
- 3 I dislike myself.

8. Self-Criticalness
- 0 I don't criticize or blame myself more than usual.
- 1 I am more critical of myself than I used to be.
- 2 I criticize myself for all of my faults.
- 3 I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes
- 0 I don't have any thoughts of killing myself.
- 1 I have thoughts of killing myself, but I would not carry them out.
- 2 I would like to kill myself.
- 3 I would kill myself if I had the chance.

10. Crying
- 0 I don't cry anymore than I used to.
- 1 I cry more than I used to.
- 2 I cry over every little thing.
- 3 I feel like crying, but I can't.

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Subtotal Page 1

Continued on Back

0154018392
NR15645

Roche

V 0477

Beck Depression Inventory

CRTN: _____ CRF number: _____ Page 15 patient inits: _____

Baseline

11. Agitation

0 I am no more restless or wound up than usual.
1 I feel more restless or wound up than usual.
2 I am so restless or agitated that it's hard to stay still.
3 I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

0 I have not lost interest in other people or activities.
1 I am less interested in other people or things than before.
2 I have lost most of my interest in other people or things.
3 It's hard to get interested in anything.

13. Indecisiveness

0 I make decisions about as well as ever.
1 I find it more difficult to make decisions than usual.
2 I have much greater difficulty in making decisions than I used to.
3 I have trouble making any decisions.

14. Worthlessness

0 I do not feel I am worthless.
1 I don't consider myself as worthwhile and useful as I used to.
2 I feel more worthless as compared to other people.
3 I feel utterly worthless.

15. Loss of Energy

0 I have as much energy as ever.
1 I have less energy than I used to have.
2 I don't have enough energy to do very much.
3 I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

0 I have not experienced any change in my sleeping pattern.
1a I sleep somewhat more than usual.
1b I sleep somewhat less than usual.
2a I sleep a lot more than usual.
2b I sleep a lot less than usual.
3a I sleep most of the day.
3b I wake up 1–2 hours early and can't get back to sleep.

17. Irritability

0 I am no more irritable than usual.
1 I am more irritable than usual.
2 I am much more irritable than usual.
3 I am irritable all the time.

18. Changes in Appetite

0 I have not experienced any change in my appetite.
1a My appetite is somewhat less than usual.
1b My appetite is somewhat greater than usual.
2a My appetite is much less than before.
2b My appetite is much greater than usual.
3a I have no appetite at all.
3b I crave food all the time.

19. Concentration Difficulty

0 I can concentrate as well as ever.
1 I can't concentrate as well as usual.
2 It's hard to keep my mind on anything for very long.
3 I find I can't concentrate on anything.

20. Tiredness or Fatigue

0 I am no more tired or fatigued than usual.
1 I get more tired or fatigued more easily than usual.
2 I am too tired or fatigued to do a lot of the things I used to do.
3 I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

0 I have not noticed any recent change in my interest in sex.
1 I am less interested in sex than I used to be.
2 I am much less interested in sex now.
3 I have lost interest in sex completely.

3 4 5 6 7 8 9 10 11 12 A B C D E

_____ Subtotal Page 2
_____ Subtotal Page 1
_____ Total Score

NR15645

Geriatric Depression Scale **(GDS)**

Geriatric Depression Scale: Short Form

Choose the best answer for how you have felt over the past week:

1. Are you basically satisfied with your life? YES / **NO**
2. Have you dropped many of your activities and interests? **YES** / NO
3. Do you feel that your life is empty? **YES** / NO
4. Do you often get bored? **YES** / NO
5. Are you in good spirits most of the time? YES / **NO**
6. Are you afraid that something bad is going to happen to you? **YES** / NO
7. Do you feel happy most of the time? YES / **NO**
8. Do you often feel helpless? **YES** / NO
9. Do you prefer to stay at home, rather than going out and doing new things? **YES** / NO
10. Do you feel you have more problems with memory than most? **YES** / NO
11. Do you think it is wonderful to be alive now? YES / **NO**
12. Do you feel pretty worthless the way you are now? **YES** / NO
13. Do you feel full of energy? YES / **NO**
14. Do you feel that your situation is hopeless? **YES** / NO
15. Do you think that most people are better off than you are? **YES** / NO

Answers in **bold** indicate depression. Score 1 point for each bolded answer.

A score > 5 points is suggestive of depression.
A score ≥ 10 points is almost always indicative of depression.
A score > 5 points should warrant a follow-up comprehensive assessment.

The Short Form 12 (SF-12)

SF-12 Health Survey

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. **Answer each question by choosing just one answer**. If you are unsure how to answer a question, please give the best answer you can.

1. **In general, would you say your health is**:

☐1 Excellent ☐2 Very good ☐3 Good ☐4 Fair ☐5 Poor

The following questions are about activities you might do during a typical day. Does <u>your health now limit you</u> in these activities? If so, how much?

	YES, limited a lot	**YES, limited a little**	**NO, not limited at all**
2. **Moderate activities** such as moving a table, pushing a vacuum cleaner, bowling, or playing golf.	☐1	☐2	☐3
3. Climbing **several** flights of stairs.	☐1	☐2	☐3

During the <u>past 4 weeks</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of your physical health</u>?

	YES	**NO**
4. **Accomplished less** than you would like.	☐1	☐2
5. Were limited in the **kind** of work or other activities.	☐1	☐2

During the <u>past 4 weeks</u>, have you had any of the following problems with your work or other regular daily activities <u>as a result of any emotional problems</u> (such as feeling depressed or anxious)?

	YES	**NO**
6. **Accomplished less** than you would like.	☐1	☐2
7. Did work or activities **less carefully than usual**.	☐1	☐2

8. **During the <u>past 4 weeks</u>, how much <u>did pain interfere</u> with your normal work (including work outside the home and housework)?**

☐1 Not at all ☐2 A little bit ☐3 Moderately ☐4 Quite a bit ☐5 Extremely

These questions are about how you have been feeling during the <u>past 4 weeks</u>.
For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the <u>past 4 weeks</u>…

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
9. Have you felt calm & peaceful?	☐1	☐2	☐3	☐4	☐5	☐6
10. Did you have a lot of energy?	☐1	☐2	☐3	☐4	☐5	☐6
11. Have you felt down-hearted and blue?	☐1	☐2	☐3	☐4	☐5	☐6

12. **During the <u>past 4 weeks</u>, how much of the time has your <u>physical health or emotional problems</u> interfered with your social activities (like visiting friends, relatives, etc.)?**

☐1 All of the time ☐2 Most of the time ☐3 Some of the time ☐4 A little of the time ☐5 None of the time

Patient name: Date: PCS: MCS:

Life Space Questionnaire **(LSQ)**

Life Space Questionnaire

Interviewer: " I am interested in all the places that you have been within the last **3 days**.

1. During the past 3 days, have you been to other rooms of your home besides the room where you sleep?

   1 = _____ Yes 2 = _____ No **1.** ☐

2. During the past 3 days, have you been to an area immediately outside your home such as your porch, deck or patio, hallway of an apartment building, garage?

   1 = _____ Yes 2 = _____ No **2.** ☐

3. During the past 3 days, have you been to an area outside your home such as a yard, courtyard, driveway, or parking lot ?

   1 = _____ Yes 2 = _____ No 3. ☐

4. During the past 3 days, have you been to places in your immediate neighborhood, but beyond your own property or apartment building?

   1 = _____ Yes 2 = _____ No **4** . ☐

5 During the past 3 days, have you been to places outside your immediate neighborhood but within your town or community?

   1 = _____ Yes 2 = _____ No **5.**. ☐

6. During the past 3 days, have you been to places outside your immediate town or community?

   1 = _____ Yes 2 = _____ No **6.** ☐

7. During the past 3 days, have you been to places outside of your county?

   1 = _____ Yes 2 = _____ No **7.** ☐

8. During the past 3 days, have you been to places outside the state of Alabama?

   1 = _____ Yes 2 = _____ No **8.** ☐

9. During the past 3 days, have you been to places outside the southeast region?

   1 = _____ Yes 2 = _____ No **9.** ☐

Appendix B

Age Effects on Completion Versus Non-Completion

To determine the effect of age on completion versus non-completion of the DREAMS programs (remote and in-person), an independent t-test was performed. 130 participants met the inclusion criteria. Among the in-person participants (n=95), 15 participants did not complete at least six modules. All participants in the remote group (n=35) completed the program. Comparing the 115 completers (In-person DREAMS, n=80; Remote DREAMS, n=35) to the 15 non-completers of the overall study, the non-completers were significantly older than the completers ($p=0.039$).

Appendix C

Author's Contributions

Material preparation and data collection were performed by Liang Ni, Allison Bay, Ariel Hart, and Dr. Madeleine Hackney. Statistical analysis was carried out using R software (version 3.4.4) by data analysts, Jiayang Song and Liang Ni. Biweekly meetings to analyze and interpret the results and collected data were completed with Anjali Shah, Liang Ni, Allison Bay, and Dr. Madeleine Hackney. The thesis was written fully by Anjali Shah with guidance and mentorship from Liang Ni, Allison Bay, and Dr. Madeleine Hackney.