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Empowering Older Adults Through Values-Informed Solutions for Technology Adoption (VISTA): A Feasibility and Acceptability Randomized Control Pilot Trial Protocol

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Abstract

Methods: We enrolled 20 participants in a 1:1 randomized pilot control trial with waitlist control. Inclusion criteria included aged 65 and older with English proficiency and willingness to improve digital literacy. Exclusion criteria involved severe cognitive impairment. Over the course of 8-12 weeks, participants received up to six in-home biweekly visits and interim phone calls based on their individual digital literacy needs and participant-directed goals. Each participant also received internet connectivity and a tablet if not already available. Our main outcome was digital literacy improvement. We also assessed technological self-efficacy, digital health literacy, quality of life, and measures of physical and emotional well-being.
Discussion: This protocol offers a unique model centering the values and goals of older adults to improve access, use and understanding of technology. Tapping into the motivators of older adults may offer a more beneficial way to encourage older adult technology use. VISTA could be useful in many contexts- home bound or seriously ill older adults or as a pre-intervention for interventions involving advanced technology understanding.

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ABSTRACT

Introduction: Although technology usage is steadily increasing among older adults, adoption and confidence greatly lags behind their younger counterparts. Sociocultural and health disparities intersect with aging to present distinct structural and psychosocial barriers to adoption of newer technologies. Growing evidence suggests that digital health literacy interventions may improve technology skills, increase technological self-efficacy, and increase frequency of technology use. However, these digital literacy interventions do not systematically consider participants' values and goals, which we know are key to long term behavior change.

Purpose: The proposed study aims to develop and evaluate the acceptability and feasibility of a person-directed, values-based digital literacy intervention for older adults.

Methods: We enrolled 20 participants in a 1:1 randomized pilot control trial with waitlist control. Inclusion criteria included aged 65 and older with English proficiency and willingness to improve digital literacy. Exclusion criteria involved severe cognitive impairment. Over the course of 8-12 weeks, participants received up to six in-home biweekly visits and interim phone calls based on their individual digital literacy needs and participant-directed goals. Each participant also received internet connectivity and a tablet if not already available. Our main outcome was digital literacy improvement. We also assessed technological self-efficacy, digital health literacy, quality of life, and measures of physical and emotional well-being.

Discussion: This protocol offers a unique model centering the values and goals of older adults to improve access, use and understanding of technology. Tapping into the motivators of older adults may offer a more beneficial way to encourage older adult technology use. VISTA could be useful in many contexts- home bound or seriously ill older adults or as a pre-intervention for interventions involving advanced technology understanding.

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Keywords: self-efficacy, digital literacy, person-centered care, frailty, shared decision-making, older adult

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INTRODUCTION

As technology advances, it increasingly shapes the everyday lives of older adults.[1] Digital tools- such as remote patient monitoring, telemedicine, smartphone applications, and online support groups- are being actively investigated for their ability to deliver support across multiple domains of well-being and encourage aging in place.[1-5] When adopted, these technologies can help older adults access medical care from home, maintain social connections through video calls or messaging services, manage daily activities via smart home devices, and receive timely information about their health conditions. These solutions can enhance older adults' independence, comfort, and safety, enabling them to remain living in their own homes for longer periods.[6]

Digital literacy is the technical and cognitive ability to use communication technologies to find, evaluate, create and communicate information.[7] Although technology usage is increasing among older adults, 1 in 4 do not use the internet at all and less than half own a tablet.[8] These findings may be at least partially attributed to the fact that 22 million (42%) older adults in the United States (US) lack home internet access.[9] Psychosocial barriers also disrupt older adults' adoption and utilization of technology, including lack of awareness, low technological self-efficacy, low digital literacy, and negative attitudes toward technology.[10-12] In contrast, older adults with access to training and technical support are more likely to adopt technology.[13,14] Additionally, like their younger peers, older adults are more likely to adopt technology if they perceive it as valuable and useful for improving the quality of their lives.[12,15]

Digital health literacy is considered a super determinant of health.[16] Socio-cultural and health differences intersect with age in technology usage patterns. Physical frailty[17], lower income[18], and limited education are associated with reduced technology engagement and negative attitudes toward information and communication technologies (e.g., tablets).[19]

High costs and limited access often prevent adoption, especially among culturally and linguistically diverse groups, who also encounter language and resource barriers[20,21], whereas White and English-speaking older adults use digital technology more frequently.[22]

Growing evidence suggests that digital health literacy interventions may improve specific technology skills, increase technological self-efficacy, and increase frequency of technology use.[23-25] However, research objectives for these digital literacy interventions do not routinely consider participants' goals and preferences, which we know are salient motivators to behavior change[26] and a focus of the Age-Friendly Health System movement.[27] Digital literacy interventions often focus on a single technology and the development of a specific set of skills (e.g., locating and evaluating health information through their electronic health record) rather than developing transferable and individualized skills. Existing digital literacy programs also typically require that older adults go to a senior center, library, or access resources over the phone, thus introducing another barrier for older adults who are frail, functionally limited, and less socially active.[28]

The proposed study aims to develop and evaluate the acceptability and feasibility of a person-directed, values-based digital literacy intervention for older adults with and without frailty. We propose to achieve this aim by recognizing and leveraging person-directed values and goals to drive motivation to learn new technological skills. We view internet access and training as not only addressing health literacy and health system communication domains but also as: 1. natural extensions of the home environment[29] and 2. methods to address the growing health disparities caused by unequal internet access and technology use.[30,31]

METHODS

Conceptual Framework

Our conceptual framework is adapted from three important theories of human

behavior and digital uptake. Social cognitive theory, developed by Dr. Albert Bandura, emphasizes the importance of observational learning, social influence and the interaction between personal factors, behavior and one's environment (reciprocal determinism).[32] Developed by the same psychologist, self-efficacy theory, which is the center of reciprocal determinism in social cognitive theory, refers to an individual's confidence in their ability to perform specific tasks or behaviors and is associated with greater motivation and persistence in overcoming challenges.[26,33] The Technology Acceptance Model describes how factors like the perceived usefulness and ease of use of technology influence one's acceptance of that technology.[34] Our model adaptation leverages all three theories to: (1) Build confidence in technology use through mastery experiences, modeling, social support and positive reinforcement, (2) Align technology use goals with what matters most to the older adult to enhance relevance and engagement and (3) Address technology preferences and reduce perceived barriers through internet access and user-friendly, age-appropriate training.

[Insert Figure 1. Adapted Conceptual Model]

Intervention Development & Human Centered Design

This intervention was developed in part using human-centered design principles. Human-centered design is a collaborative process involving the end-user as a part of the intervention development process in order to best understand and serve people's needs.[35] Intervention development occurred over the course of 12 months and involved interviews and focus groups with older adults with multimorbidity that identified digital literacy as a need to help facilitate overcoming many other health related barriers around communication, health knowledge and support.[36]

Intervention Components

Over the course of 8-12 weeks, participants received four to six in-home biweekly visits with three to four interim phone calls based on their individual digital literacy needs and goals. Each participant received a tablet if not already available. Participants without home internet were assisted in applying for low-cost internet services through federal, state, and local affordability programs and paid for by the study for the duration of the study. The difference in visit numbers is partially determined by the participant's goals, current digital literacy, and their current internet connectivity. See **Table 1** for more information on the intervention timeline and key components.

This pilot intervention centered the participants' own values and goals in order to co-develop bi-weekly individualized action plans with the interventionist. These action plans formed the base of the intervention design. See exemplars for individualized action plans in **Table 2**. There were 4 main components to this intervention, namely: (1) Eliciting Values and Goals, (2) Mapping Values and Goals onto Technology Goals, (3) Co-creating action plans with participants using the Goals Worksheets, and (4) Using the Values Informed Solutions for Tech Adoption (VISTA) Technology Handbook to develop confidence and specific technological skills.

1. Eliciting Values & Goals: The interventionist met with the participant to review their values and goals using the What Matters Most framework to guide the conversation.[27,37,38] Using **Figure 2**, the interventionist asked - "Which areas are particularly important to you?"

[Insert Figure 2. Identifying what matters most to the participant]

2. Mapping Values & Goals onto Technology: The interventionist and participant brainstormed different ways technology can be used to help the participant meet their

goals. The interventionist asked - “How do you think the iPad may be able to help you live out your values?” They then engaged in an in-depth discussion about the participant’s past experiences using technology, including barriers, facilitators, and strategies to support learning and address barriers during the training.

3. Action Planning using Goals Worksheets: The interventionist provided a “What is a S.M.A.R.T. Goal” handout and reviewed the information with the participant. Together, they worked on a “Technology S.M.A.R.T. Goal Worksheet” to establish 1-3 technology goals for the intervention. S.M.A.R.T. goals are clear and actionable objectives that are specific, measureable, achievable, relevant and time bound.[39] The interventionist helped the participant reflect and write down their motivations for achieving the goal, potential obstacles, problems solving strategies, and indicators that can be used to track progress toward achieving the goal.
4. VISTA Handbook: A study handbook was developed to help facilitate basic technological knowledge through text and activities that can be assigned as part of the individualized action plans. Based on the individualized goals co-created by the interventionist and participant, specific activities and units within the VISTA handbook were assigned to facilitate learning how to use and building confidence with using technology. (See Supplemental Table 1 for Table of Contents for VISTA Handbook).

Interventionist Training

Interventionists were selected based on their expertise in technology, working with older adults, and skills in therapeutic communication and motivational interviewing. Interventionists received additional training in SMART goal setting, active listening, empathy, open-ended questioning, reflective responses, nonverbal communication, and the essentials of building rapport and trust. We accomplished this through didactic and role-playing situations including assessing and working with participants at different stages of readiness for change.[40] Interventionists were directly supervised by the principal

investigator and study coordinator with regularly scheduled coaching throughout the intervention for skill refinement and problem-solving around challenging cases.

Study Design

This was a single-blinded waitlist controlled randomized pilot trial to test the feasibility and acceptability of the VISTA intervention. Our target sample size was 20. Trial participants who enrolled were randomized into the immediate intervention or waitlist control groups. The immediate intervention group (n=10) received the intervention during weeks 0-12. The waitlist control group (n=10) began the intervention approximately at week 12 through approximately week 24. Waitlist control design is used to provide an untreated comparison group while still allowing those participants to receive the intervention at a later date.[41]

Study Population & Recruitment

Recruitment took place through flyers within the Baltimore community and surrounding counties in senior centers and senior living communities. Inclusion criteria comprised participants aged 65 and older with English proficiency and willingness to improve digital literacy. We excluded participants with severe cognitive impairment.[42] Participants randomized to the intervention completed a survey assessment during a pre- and post-intervention visit with the research team and received a $50 gift card for each of those two visits. Additionally, control participants had one additional data collection visit post-control/pre-intervention.

Informed Consent

Prior to data collection, a research team member sat down with each participant to review the purpose of the study, procedures during the study, confidentiality and risks and benefits of participation. They emphasized that study participation was voluntary and that they could leave the study at any time. The research team member provided an

opportunity for discussion and questions and assessed the participant's comprehension of the information provided. Written consent was signed with a copy given to the participant. This study was approved by the Johns Hopkins University Institutional Review Board (IRB00437921). The trial was registered at ClinicalTrials.gov (NCT06479707).

Data Collection and Management

Study data was collected and managed using REDCap (Research Electronic Data Capture), a secure, web-based platform.[43] REDCap supports real-time data entry, validation checks, and branching logic to ensure data quality. Data was stored on secure servers at Johns Hopkins University with firewalls and regular security monitoring. Access was role-based: interventionists accessed personally identifiable information (PHI) required for delivering the intervention, while other study personnel accessed only de-identified data. All activity was logged via an audit trail, and data exports for analysis were de-identified whenever possible. The study team performed routine data quality checks, including range and logic checks, to ensure accuracy and completeness.

Feasibility and Acceptability

We assessed acceptability by employing a satisfaction survey at the end of the intervention with questions about the program content and structure using Likert scale-based questions and open-ended questions as well as people's willingness to recommend the intervention to others.[44] Feasibility was assessed by analyzing the following data: Recruitment Rate, Completion Rate, Data Collection Rate, Mean time for survey administration, Withdrawal Rate, and Cost per person.[45] Feasibility was also assessed through evaluation of interventionist visit recordings and fidelity checklists.

Main Outcome and Co-variates

Although not powered for effectiveness, our main outcome variable was digital literacy collected using the 16-item Mobile Device Proficiency Questionnaire (MDPQ).[46]

The MDPQ has 8 subsections with two questions each on the following digital literacy topics: using a mobile device, communication, data and file storage, internet, calendar, entertainment, privacy, and troubleshooting & software management. The stem of each question starts with “Using a mobile device, I can…” and ends with statements like: “setup a password to lock/unlock the device” or “find information about my hobbies and interests in the Internet”. This scale measures all 5 competencies as outlined in the European Commission’s Digital Competence Framework.[47,48]

We also assessed self-efficacy for coping, technology and chronic disease management, digital health literacy, quality of life, communication and social engagement. **Table 3** outlines each construct and variable collected. Additional covariates collected included: age, sex, race/ethnicity, chronic disease count, medications, and frailty status using the Fried Physical Frailty Phenotype.[49]

Fidelity Plan

Our fidelity plan was modeled after the NIH Behavior Change Consortium (BCC) Fidelity Plan which was developed to ensure that behavioral interventions are implemented consistently.[50] We maintained fidelity by: (1) Clearly defining the core components of the intervention, including specific content, delivery methods and dose, (2) Requiring consistent documentation with 10% of sessions being audio recorded and reviewed by the research coordinator using *a priori* fidelity checklists for monitoring content, (3) Standardized training of our interventionists with ongoing assessment and coaching, and (4) Assessing participant engagement.

Analysis

This is a pilot randomized control trial primarily for feasibility and acceptability. Although not powered for effectiveness, descriptive analysis will be completed for all study variables, scales, satisfaction and feasibility data. Variables will be described with means

and standard deviations or medians and interquartile ranges accordingly. Participants also provide short-answer responses describing their personal goals and priorities related to technology. Using qualitative content analysis, responses will be coded into themes, allowing the team to explore patterns across participants and integrate these insights with outcomes from validated scales. Effect sizes for digital literacy, our main outcome measure, will be assessed to determine sample size needed to inform a larger future effectiveness trial.

DISCUSSION

We find multiple strengths in this intervention. First, VISTA utilized a person-directed, human-centered design approach. The intervention focuses on mapping participants' own values and goals onto an action plan for building individualized digital skills that address their specific needs. In the current Age-Friendly Health System movement, what matters most to the patient is becoming a more important metric to evaluate intervention and/or treatment effectiveness.[51,52] VISTA is person-directed and focuses on what matters most to the participant, aligning well with this emerging model of care for older adults.

Designing VISTA to be person-directed also improves health fairness and parity. One-size-fits-all intervention design does not account for the diversity of goals and values nor the potential needs of each person, which is in line with current thinking.[53]

Additionally, VISTA focuses on improving digital equity for vulnerable older adults by reaching older adults with functional limitations within the home. The intervention also offers assistance with securing home internet and supplying technology. This removes barriers to accessing technology, such as lack of transportation, limited mobility, and cost concerns. Delivering the intervention within the home environment may also reduce anxiety leading to better overall engagement and learning outcomes. It gives us insight into how older adults

environment influences adoption of technology, their experience as end-users of digital technology, and their unique preferences and values when it comes to engaging with technology.

Limitations. The study recruited a small sample of 20 participants which limits the generalizability of the study findings. Recruiting older adults ≥65 years proficient in English without severe cognitive impairment predominantly located in the Baltimore region also limits its generalizability. However, the point of the study is simply to test if it is feasible and if participants stay in the intervention and to get their feedback. This intervention may not address the needs of culturally or linguistically diverse populations that experience additional barriers to accessing technology, such as geographic isolation, language and communication barriers.

Despite study limitations, this protocol offers an innovative model for helping vulnerable older adult populations improve access to technology and understand the benefits it can offer using their own valuesand goals as a guide. Future preliminary expansion plans include incorporating multilingual facilitators to reach older adults with language barriers, thinking through adaptations for use in a rural context, usage as a “pre-tech intervention” to address recruitment bias in technology intervention recruitment and resulting health inequities and use in other settings like assisted and skilled nursing communities.

Dissemination

We aim to disseminate our findings at national conferences to gather feedback from experts in the fields of aging and technology. The study findings will also be published in a reputable peer-reviewed journal. Furthermore, results of this feasibility and acceptability study will be used to inform the design of a randomized control trial to evaluate the efficacy and effectiveness of the intervention. Future research will assess the cost versus benefit of

the intervention and devise strategies for long-term sustainability and adaptation for diverse contexts.

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Conflicts of Interest:

MDH would like to disclose consultant work for Fresenius Medical Care in 2024 for two days.

Data Availability:

Once results are published from this trial, the data will be made available from the corresponding author on reasonable request.

Authors' Contributions:
Conceptualization: MDH (lead), OCR (supporting)
Funding acquisition: MDH
Investigation: MDH
Methodology: MDH (lead), OCR, DW (supporting)
Project administration: SC (lead), MDH, SH, AH (supporting)
Resources: SC (lead), MDH (supporting)
Supervision: MDH (lead), SLS, MMD, DC (supporting)
Validation: SC (lead), MDH (supporting)
Visualization: MDH
Writing – original draft: MDH (lead), OCR (supporting)
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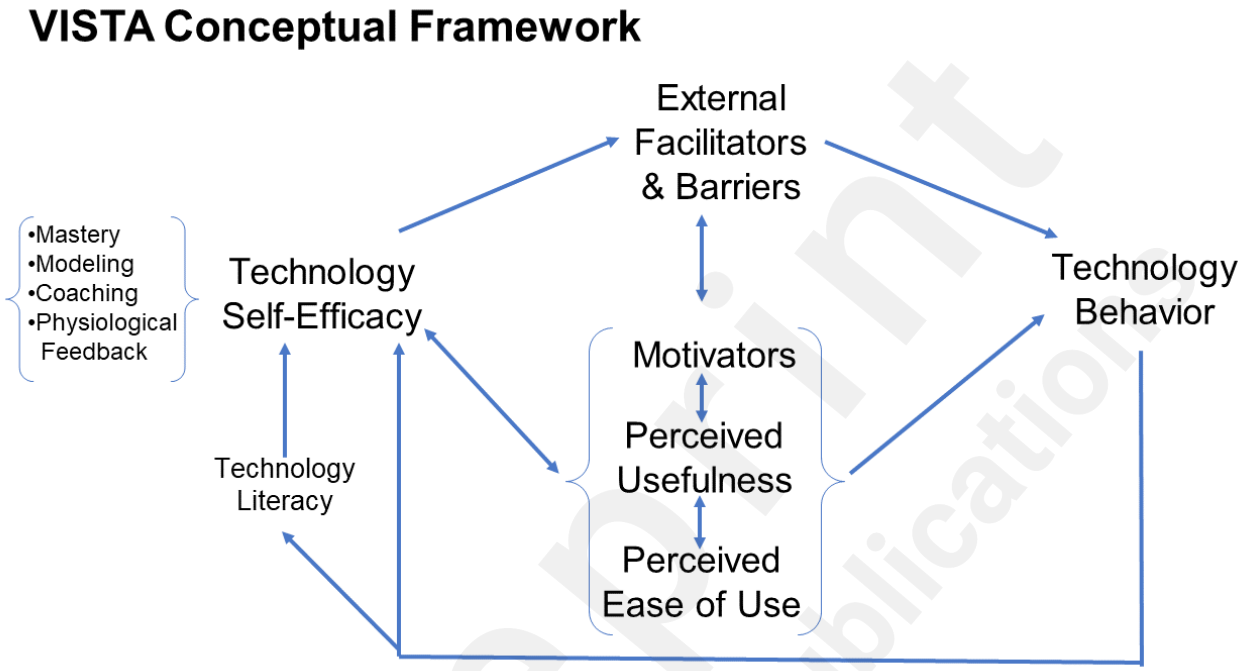
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Figure 1. Adapted Conceptual Model



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Figure 2. Identifying what matters most to the participant

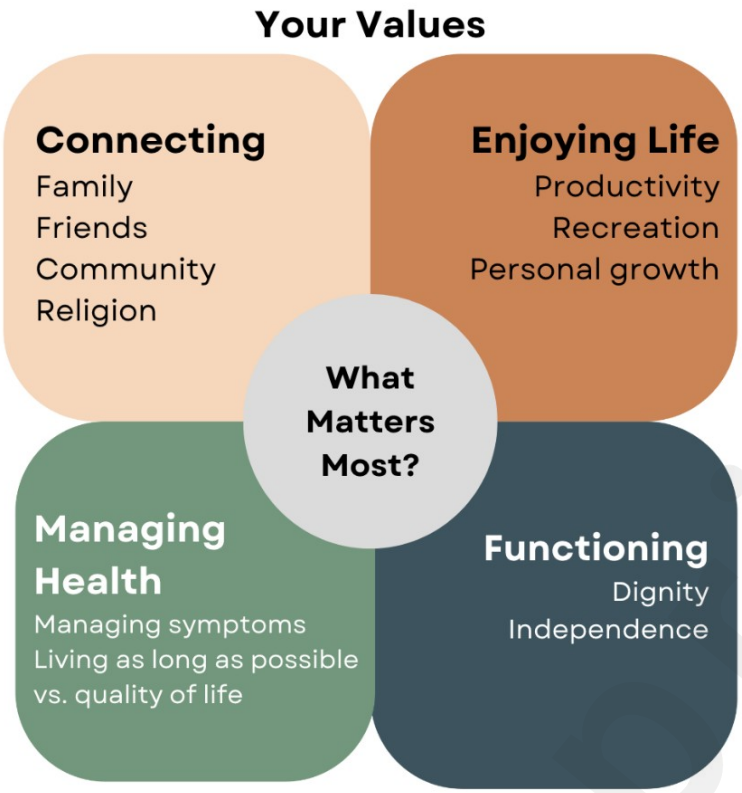


Table 1. Intervention Visit Timeline

Time	Key Activities
Baseline Visit	Consent and Baseline data collection
Week 1 (optional)	Granted for persons with no internet connectivity to aid in connection process
Week 2 (optional)	Granted for persons with no prior use of smart technology (phone or tablet) or who have never used a touchscreen before
Week 3	Eliciting General Goals and Values, Applying to technology Co-creating Technology-related SMART Goals iPad Set-up Unit 2 of handbook as related to Goals Assign Relevant Activities
Week 4 (TC)	Review progress, facilitators, barriers and problem solve
Week 5	Unit 3 & 4 as related to Goals Assign Relevant Activities
Week 6 (TC)	Review progress, facilitators, barriers and problem solve
Week 7	Unit 5, 6 & 7 as related to Goals Assign Relevant Activities
Week 8 (TC)	Review progress, facilitators, barriers and problem solve
Week 9	Discuss goal attainment Recommend next steps
Post-Intervention Visit	Post-intervention data collection

Notes. TC: Telephone Call

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Table 2. Exemplars of Values-Based Technology Goals and Intervention Approaches

Example Goals	Goal Specific Action Plan Items	Non-Goal Specific Action Plan Items*
• Video conversations with Grandson	• Talk to grandson on FaceTime calls three times weekly for 10-15 minutes	• Orient to the iPad Homescreen • Practice different touchscreen gestures • Learn how to charge my tablet • Successfully connect iPad to Wifi • Search the internet for organizations that advocate for people with my health condition • Learn about tablet apps and how to download • Successfully set up a social media account
• Access MyChart health record	• Practice signing in and navigating MyChart app to find recent lab results and visit notes	
• Manage my medications via Apple Health	• Navigate Apple Health app and enter current medication list	
• Connect with chronic disease support groups	• Practice navigating internet and find at least one support group on a professional health organization website	
• Complete online age-appropriate exercise workout	• Use YouTube app to find SilverSneakers videos and engage in 5-10 minutes exercise three times weekly	

*These action plan approaches are chosen by interventionist and participant based on current digital literacy needs in order to achieve goal specific action. This is not a comprehensive list of non-goal specific action plan item options.

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Table 3. Constructs, Instruments and Reliability

Theoretical Construct	Instruments and Variables	Number of Items	Reliability (Cronbach's Alpha)
Digital Health Literacy	Mobile Device Proficiency Questionnaire[46]	16	0.99
Self-Efficacy	Coping Self-Efficacy[a,54]	13	PS 0.91 ER 0.91 SC 0.80
	Self-Efficacy of Chronic Disease Management[55]	6	0.88
	Digital Self-Efficacy[b,56]	10	0.96
Quality of Life	Short Form 36, select sections[c,57]	29	0.77
Social Engagement	Lubben Social Network Scale[58,59]	6	0.83
Health Team Communication	CollaboRATE Scale Measure[60]	3	n/a
Frailty	Fried Frailty Phenotype Scale[61]	5	n/a

Other Variables collected include: Age, Sex, Race/Ethnicity, Chronic Diseases, Medications
Notes. [a]Coping Self-efficacy has 3 subscales. PS: Problem Solving Subscale, ER: Emotional Regulation Subscale, SC: Social Coping Subscale
[b]This is an adapted version of this scale.
[c]Sections for general health, physical and social function, pain, and emotional well-being included.

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Supplemental Table 1.

Table of Contents for VISTA Handbook

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“Hands-On” Tablet Training for Older Adults

Table of Contents

HANDS-ON TABLET TRAINING GUIDE



VISTA

VALUES-INFORMED SOLUTIONS FOR TECH ADOPTION