Disaster Preparedness Intervention for Older Adults (Senior's Positive Involvement in Community Emergencies SPICE): Protocol for a Quasi-Experimental Study

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Abstract

Background: Older adults comprise a substantial proportion of the U.S. population requiring support during disaster events. Previous research demonstrates older adults are resilient but deficient in disaster preparedness and lacking in community engagement. There is a gap in high quality research in this area.

Objective: Our study aims to fill this gap by developing a four phased intervention to improve mobility, balance and decrease fall risks (mitigation), increase knowledge of disaster preparedness (preparedness), improve community emergency operation plans (response), and improve self-efficacy in disaster recovery (recovery) for older adults.

Methods: This is a community based ten-month study in a large Midwest urban/suburban location targeting community dwelling older adults. Seminars are provided to improve disaster preparedness and recovery planning. Mitigation efforts to improve mobility and safety are offered with ten visits to the older adult's residences adapting physical activity and balance exercises to the individual's needs. Emergency Operations Plans for two of the major cities will be reviewed and amended for specific functional needs and access guidelines. Measurements include accelerometers to assess improvement in mobility, fall risk assessments, an abbreviated FEMA Household Survey, Assessment for Disaster Engagement with Partners Tool, Brief Pain Inventory Assessment, and the General Self-Efficacy Scale. Overarching objectives prioritized during this intervention include underscoring respect for the experience and resilience found in older adults and engaging them in specialized roles supporting their communities during disaster events.

Results: The intervention began November 2023 and will conclude October 2024. Published study results can be expected in early 2025.

Conclusions: With improved disaster preparedness, mobility, recovery planning, and inclusion as a resource in community disasters, older adults are expected to be safer and able to age in place. If successful, future studies will focus on outreach and sustainability. This study will serve as a model for older adult disaster preparedness and community involvement.

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Keywords: older adults; disaster preparedness; emergency preparedness; disaster protocol

Introduction

Older adults experiencing disaster events are disproportionately at risk for morbidity and mortality [1,2]. This population is increasing to one in five Americans by 2050 [3], with 39.5 percent needing equipment to perform activities of daily life [4]. The Federal Emergency Management Association's (FEMA) Household Survey on Disaster Preparedness [5] results reported a disconnect between the older adult population's perception of preparedness and their preparedness actions, prompting FEMA to urge communities and emergency managers to focus on and empower this population to meet their unique situations and challenges prior to disasters. FEMA's survey results found a lack of planning for disasters, preparing evacuation, family communication, participation in drills, and involvement with their community and neighbors among American older adults. Evidence suggests that while older adults are more resilient in disasters [6], they are also more isolated [7].The National Academies of Sciences et al. (2020) reports isolation is exacerbated during disaster events, recommending improved connection with communities [8]. Due to time horizons, older adults are uniquely susceptible to disaster mental health issues. Mental Health and lack of access to medical care post disaster require specific attention for this population. After Hurricane Sandy, Corley et al., (2022) found that older adults had increased anxiety, stress, and Post Traumatic Stress Disorder (PTSD).

Current risk management efforts focus on preparedness, mitigation, and planning for recovery, along with acute response to the disaster event [3]. While literature is scarce and dated on interventions that improve disaster preparedness and self-efficacy, Ashida et al., (2016) notes some convincing evidence of positive outcomes from post preparedness education. Pre-event decisions should be planned for prior to the disaster event to improve peace of mind and individual response times [11]. Additionally, this population is motivated by a need to feel valued rather than expendable [12]. Seniors have had experience with disasters, wars, and challenges in their lives, expertise which may be reflected in the data supporting their increased resilience in emergencies [13,14]. They provide experience from previous successes or learning from previous failures, giving value to the older

adults and hope to survivors. There is one primary and four secondary hypotheses for this study. Primary: The interventions will show significant improvement in disaster preparedness knowledge for community dwelling older adults (CDOA) from the pre to the post survey. This will be supported by 4 sub hypotheses: Mitigation: The intervention will demonstrate improved mobility and safety pre intervention to post intervention. Preparedness: The seminar interventions will demonstrate significant improvement in household disaster readiness measured by the FEMA household survey pre intervention to post intervention. Response: The collaboration between supporting disaster management organizations will improve interagency teamwork and communication after the intervention as measured by the Assessment for Disaster Engagement with Partners Tool. Recovery: The self-efficacy of CDOA will statistically improve pre-intervention to post intervention.

Methods

Study Design

This is a four phase, quasi-experimental study conducted in a Midwest United States metropolitan area. Population included all CDOA defined as those equal to or older than 65 years of age living independently. Support from 12 organizations including public health departments, emergency management councils, regional support councils, and disaster volunteer organizations was obtained. Partner organizations provide a host location and recruitment for the seminars through organizational emails, flyers, and word of mouth. Childcare is offered allowing older adults that are babysitting during daytime hours to attend. Four seminars include Spanish interpretation and materials. Option for study involvement is voluntary and private. The four phases follow disaster phase principles and are: mitigation, preparedness, response, and recovery.

Mitigation: To improve mobility and mitigate the loss of life during disasters, we are recruiting a sample of older adults to participate in a 10-week prospective, pre-test/post-test, fall prevention and physical activity intervention.

Preparedness: Fours seminars a month will be given for one hour with a PowerPoint

presentation on disaster preparedness, decision making, communication, and county/state resources available. The Personal Preparedness Inventory is started with assistance from a research assistant, ending in the culmination of a red Critical Information Packet to be stored at their home for emergencies. All are welcome to attend whether they opt in for the study or not. Two test seminars were held to obtain feedback from participants on the value of the information given and method of delivery. Feedback included having more interaction and making the information more concrete and less abstract.

The study participants are orally consented and then asked an abbreviated version of the FEMA household survey. One week after the seminar, the same research assistant will phone the participant and ask the same questions. All answers are documented in Qualtrics, a secure encrypted data gathering and analyzing program, for confidentiality. Media releases for educational sharing of photos are signed upon entering the seminars.

Response: Two city emergency management departments and eight community support organizations and coalitions were engaged to participate in a review of their current emergency operations plan with a focus on improving integration of older adult needs. The organizations agreed to participate in writing before beginning work with the research team. Research assistants were then provided with copies of organization emergency plans and participated in discussions with stakeholders to create organization-specific recommendation guides based on current literature and community assessments to address identified challenges for older adults. Members of leadership and registered personnel of participating organizations were asked to rate their organization's level of partner engagement by completing the Assessment for Disaster Engagement with Partners Tool (ADEPT) [15] via an online survey before engaging in the plan review and again after the research team presented their recommendations at the close of the project. Responses to both surveys were recorded in Qualtrics and compared to measure changes in four domains of partner engagement: communication outreach and coordination, resource mobilization, organizational capacity building,

and partnership development and maintenance.

Recovery: Like the preparedness phase, four 20-minute seminars per month in conjunction with the preparedness seminars, are also delivered to community-dwelling older adults on disaster recovery. Similarly, this phase of the project underwent two test seminars with near identical feedback to that of the preparedness phase. Participants are orally consented by a team of research assistants and are administered the General Self-Efficacy Scale (GSES) prior to the seminar. As an intervention study, research assistants will also re-administer the GSES via phone one week after the seminar to examine any changes in perceived self-efficacy pertaining to disaster recovery. Oral responses will be recorded in Qualtrics by the research assistants.

Ethics Approval: All phases were submitted and approved by the University of Missouri Kansas City Institutional Review Board 2094344, 2097949, 2098365, 2098527.

Description of the Intervention

Overview of the Program

"Senior's Positive Impact on Community Emergencies" is a community-based intervention targeting CDOA aged 65 or older. The program's intent is three-fold: To improve disaster preparedness for older adults whose independent living does not afford them the protections of extended care facilities, improve community involvement and respect for the known experiential depth of our older populations, and create a safer environment during disaster events. There is an overabundance of literature on the need for specific interventions during disasters [4,11,16,17] but little to no studies conducted on the effect of interventions to improve this situation.

Mitigation Programing: At enrollment, participants will be provided an accelerometer to assess baseline physical activity for 1-week; research assistants will determine a time to visit the participant's home to collect the accelerometer and to conduct the first home visit. During the first session, research assistants will assess home fall hazards using the Fall Prevention Checklist [18]. In response to the checklist, research staff will develop a plan with the participant to modify their home

environment to prevent fall risks. A balance assessment will also be conducted using the Timed Up and Go test (TUG) [19]. Additionally, research assistants and participants will develop small, realistic physical activity goals for the 10-week intervention using the Go4Life goal-setting worksheet [20]. Potential goals include doing balance or chair exercises, walking around their home, and walk outside for 10-30 minutes. Research assistant will go to the participant's home once per week for one hour to exercise with the participant. Measures will be re-assessed at the conclusion of the intervention for a post-test comparison.

Preparedness Programing: Four seminars per month are given with a 20-minute PowerPoint interactive session and a 15-minute time block in which research assistants provide help completing the participants Critical Information Packet and individualizing it for their community. The following disaster preparedness subjects are included: Statistics on the cost and incidence of natural disasters, alerts versus warnings, decisions such as shelter in place or evacuation, supplies, disaster pet rescue, communication plans, transportation, medication, important documents, and medical equipment. The Critical Information Packet includes the Personal Preparedness Inventory, Preparedness booklet from the area emergency managers, a sheet of resources particular to the area the seminar is being given. An individual sheet with contact information or unique disaster details for the participant and their family, and a credit card sized magnifier so that all information can be easily viewed. During the breaks a disaster go bag with essential supplies is displayed near the refreshments with a list of basic go bag needs.

Response Programing: Upon establishing partner agency enrollment, the researchers begin by introducing the ADEPT survey, explaining its goals and distributing it electronically to emergency response community members [15]. This provides a baseline of current engagement metrics as reported by agency partners. Researchers then collaborate with emergency managers and community stakeholders to conduct a comprehensive review of current Emergency Operations Plans (EOPs) for the participating municipalities. Research assistants also perform a community needs assessment

identifying and verifying current resources for CDOA populations and a literature review of evidence-based practices and model EOPs addressing the needs of older adults, allowing guide designers to creatively incorporate older adults as contributing support resources in the construction of their recommendations. Research assistants then present their findings and recommendation guides in training seminar format at designated organizational meetings to inform and educate collaborators. After presentation of these seminars and deliverables, participating agency leadership and affiliated members are re-surveyed with the ADEPT inventory to assess reported engagement changes post-intervention.

Recovery Programing: The 20-minute recovery seminars include a PowerPoint presentation with the following content: defining disaster recovery, discussing common challenges in the recovery phase, explaining the role of the FEMA in recovery, descriptions of local disaster recovery centers and other community resources. The presentation concludes by reminding participants that they are survivors and not victims in disaster recovery because they have resilience and are assets to their communities. In addition to the PowerPoint presentation, participants will also receive two handouts; one that provides information on recommended actions to avoid disaster recovery scams and another that provides communication resources for disaster recovery.

Measures

Demographic Variables

The older adults' demographic variables are measured by self-reporting questions at baseline. They are asked name and phone number for the follow-up survey access, age, sex, and zip code, worded identically to the FEMA household survey questions.

Mitigation Measures: Home fall hazards are assessed pre- and post-intervention using the Fall Prevention Checklist [18]. The Fall prevention checklist assesses multiple aspects of a participant's home including stairs, loose carpets, and handrails, etc. To assess balance pre- and post-intervention, the TUG assessment will be used [19]. The TUG asks participants to get up from a chair, walk to a

place marker about 10 feet away, return, and sit back down. Baseline level of physical activity is assessed using a Garmin Vivofit 4 wrist-mounted accelerometer for one week prior to the intervention [21]. At the end of the 10 weeks, the participant will be asked to wear the Garmin device again for one week to assess physical activity after the intervention.

Preparedness Measures: Prior to and one week after the Disaster Preparedness Seminars, an abbreviated version of the FEMA household survey is orally administered by research assistants and documented in Qualtrics. FEMA Household survey questions are copied with permission verbatim from the original survey for national norming comparison. To abbreviate the survey to increase acceptance, we removed state, county, disaster awareness sources and effect, disasters not appropriate for the Midwest such as Tsunamis, types of alerts, and specific disaster questions such as pandemic, coastal flooding, earthquake, etc. Time average for taking the oral survey is 13 minutes.

Response Measures: Partner engagement will be assessed pre- and post-intervention using the ADEPT instrument [15]. The ADEPT survey assesses the impact on partner engagement relationships utilizing a 15-item set of ordinal scale questions across four domains: communication outreach and coordination, resource mobilization, organizational capacity building, and partnership development and maintenance. This tool was validated using internal consistency reliability, reasonable inter-item reliability for the four hypothesized dimensions (Cronbach's alpha: 0.71–0.88). These dimensions were confirmed through correlation and factor analysis (Varimax rotation) [15]. Completion time is approximately 15 minutes. A link to the Qualtrics survey form will be emailed to a roster of affiliated collaborator members at the beginning of the project and again at the end of the project after presentation of CDOA recommendation guides. The survey population will include disaster response organization leadership, members, and stakeholders. The survey form includes an electronic statement of consent and requires participants' affirmative submission of their data to opt into the study. The survey form also collects demographic data that includes the participant's name, contact phone, and affiliated organization/role. To support response fidelity in a comparatively small sample

population, participants will receive one follow-up email reminder to complete the survey one week after distribution and one phone call reminder two weeks after distribution for each survey. If no response from either prompt, an in-person visit from a research assistant may follow to confirm opportunity awareness. The researchers will not employ coercive methods to obtain survey responses; participation must remain strictly voluntary. Further, participant identifiers should not be used in analysis reporting and remain undisclosed.

Recovery Measures: The GSES is a 10-quesiton survey that generates ordinal-level responses pertaining to self-efficacy. Self-efficacy in this context refers to, “a person’s belief in his or her capability to successfully perform a particular task” [22]. After obtaining oral consent from participants, research assistants briefly define the meaning of disaster recovery and explain that participants will answer each question in the context of the particular task of recovering from a disaster. As previously mentioned, participants will receive follow-up surveys via phone from the research assistants one week after the recovery intervention that will be recorded in Qualtrics.

Statistical Analysis

Data preparation and analysis will be conducted in *R* [23] using a variety of base and add-on libraries available through the Comprehensive *R* Archive Network [24]. In preparing the data, we will examine missing responses to identify the mechanism most likely responsible for the missingness to determine the appropriateness of multiple imputation procedures for data recovery [25,26]. In analyzing the data, we will examine the descriptive statistics for all measured variables, evaluate the reliability of the instruments used to measure the constructs of interest, and perform appropriate cross-sectional and repeated measures analyses to address the aims guiding the project. Specifically, we will examine the associations between constructs measured at each wave using appropriate correlation techniques, such as a Pearson, Spearman, or phi correlation, to adequately account for the distributional characteristics of the variables. Additionally, we will examine changes to the constructs of interest (e.g., knowledge, self-efficacy, physical activity) using repeated measures techniques that

account for the scale of measurement (e.g., categorical, continuous) and distributional characteristics (e.g., approximate normality), such as the paired-samples t-tests, repeated measures ANOVA, Wilcoxon signed rank test, or a generalized estimating equation (GEE). We will test for statistical significance against an alpha threshold of 0.05.

Results

This study began in November 2023 and will continue through December 2024 (10 months). Trial seminars occurred in December 2023 with feedback of increasing interaction and delivering concrete actions for disaster response based on location, community, and individual needs. This was incorporated prior to the study. Results will be communicated to the professional community by publications and results will also be given in presentation form to stakeholders, organizations, and governmental entities.

Discussion

Expected Findings

With the older adult population increasing, it is important to support efforts that allow aging in place. This decreases loneliness and provides a sense of security [27,28]. Older adults are more vulnerable during disasters due to mobility, cognitive, and functional needs [1,29,30]. This study tests community-based interventions to improve household disaster literacy and community awareness of these specific needs while utilizing the population's resilience to improve community response.

Like related studies, we expect to find statistically significant improvements in mobility, preparedness, collaboration between response organizations, community involvement, and self-efficacy will be demonstrated. For example, This project is similar to the Japan Earthquake project, providing support for older adults. Miyadera et al. in Japan conducted a quasi-experiment trial of 89 older adults aged 65 or older that targeted improvements in physical activities in daily life (ADLs) [31]. The older adults' quality of life was significantly improved ($p<.01$, effect size 0.51) when focused program interventions were administered. Ashida et al. studied 194 members in a Midwest

community. After an Emergency Network Form was completed with assistance, they found statistically significant gains in non-familial networks, and emotional support [32]

Limitations and Strengths

Limitations with this study include self-reporting surveys which are subjective, with no control group to assess if the interventions influenced participants. Randomization was not used in this convenience sample. Isolated CDOAs are difficult to reach resulting in a population already prone to action during disasters and not the general population.

Strengths include support from emergency managers, public health departments, disaster response agencies, faith-based organizations, and regional governmental organizations. The overarching respect and noted value of this population in all study endeavors resonates resulting in community inclusion and interaction. The acceptance and feasibility of this study occurring in their own communities allows participation from CDOA that are many times overlooked.

Conclusion

Disaster preparedness of community dwelling older adults is a priority for many organizations in the United States. Research on the effectiveness of interventions to improved older adults' safety in prior to, during, and after disasters is lacking. This protocol describes an all-encompassing project to improve outcomes post disaster by addressing mitigating, preparedness, response, and recovery factors that influence disaster outcomes for this population. Further research needs to be conducted in this area with this population.

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Conflicts of Interest: no conflicts of interest with any author of this manuscript

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