ORIGINAL RESEARCH

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Functional Independence Beyond Mobility: Instrumental Activities of Daily Living as the Primary Predictor of Psychosocial Disaster Resilience Among Institutionalized Older Adults

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Abstract

Objective: This study aims to investigate whether independence in instrumental activities of daily living (IADL) is a stronger predictor of psychosocial disaster resilience than basic activities of daily living (ADL) among older adults residing in residential care facilities operated by a national humanitarian organization.

Materials and Methods: A cross-sectional study was conducted with 46 older adults (median age, 80.5 years; 58.7% female) residing in three residential care facilities operated by a national humanitarian organization in two provinces of Türkiye. A structured questionnaire assessed baseline disaster preparedness, functional capacity (ADL and IADL), and psychosocial disaster resilience. Multivariate logistic regression analysis was used to identify independent predictors of high resilience.

Results: Although 58.7% of participants reported receiving prior disaster awareness education, only 8.7% possessed a dedicated emergency go-bag. In univariate analyses, baseline ADL and IADL scores significantly correlated with resilience ($p<0.001$ for both). However, in multivariate analysis, only IADL capacity remained an independent predictor of high resilience (adjusted OR=2.53; 95% CI 1.04–6.18; $p=0.041$), whereas ADL capacity lost statistical significance ($p=0.114$). The model demonstrated excellent discrimination (AUC=0.889).

Conclusion: Compared to basic physical mobility, IADL capacity is the strongest independent predictor of psychosocial disaster resilience in older adults. In addition, a pronounced behavioral gap exists between the acquisition of disaster knowledge and the execution of practical preparedness actions.

Keywords: Activities of daily living, aged, disaster planning, geriatric assessment, nursing homes, psychological resilience

Introduction

The frequency and severity of natural disasters are escalating globally, posing a growing threat to public health. Geriatric populations remain at disproportionately high risk for subsequent morbidity and mortality [1]. Older adults frequently present with multiple physiological limitations, including sensory deficits, impaired mobility, polypharmacy, and cognitive decline, which severely hinder rapid evacuation and survival during the acute phase of a disaster [2]. In emergency medicine, pre-disaster preparedness is universally recognized as the optimal strategy for mitigating adverse outcomes in geriatric cohorts; international response guidelines strongly advocate for coordinated advance planning and the maintenance of essential survival supplies [3].

Historically, geriatric emergency management strategies have relied primarily on basic physical mobility assessments as the core indicator of disaster readiness. However, relying on activities of daily living (ADL) as the primary metric for preparedness overlooks critical underlying cognitive and organizational deficits that rapidly surface during acute crises [4]. For instance, an older adult may possess the physical capacity to perform ADL (e.g., ambulating, bathing, dressing) yet simultaneously lack the necessary cognitive or executive function to complete instrumental activities of daily living (IADL; e.g., managing complex medication regimens, using communication devices, handling finances, preparing meals) [5]. Deficits in IADL have been inextricably linked to heightened frailty and diminished psychological resilience during unforeseen

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catastrophic events [6]. Additionally, a notable behavioral gap permeates older adult populations: while many report high levels of perceived disaster risk or acknowledge receiving formal disaster awareness education, very few execute tangible preparedness actions, such as assembling an emergency go-bag or maintaining updated medication lists [7]. This disconnect between knowledge acquisition and actionable preparedness represents a critical failure point in current emergency management frameworks.

Situated at the intersection of multiple active seismic fault lines, Türkiye faces a high risk of catastrophic earthquakes, as evidenced by the 2023 Kahramanmaraş earthquakes [8]. Residential care centers, such as nursing homes, serve as critical infrastructure housing highly vulnerable older adults, and their disaster readiness depends on both the structural resilience of the facility and the functional capacity of its residents. Existing studies of disaster preparedness in older adults have focused largely on community-dwelling and home-care populations, in which physical impairment and mobility limitation are treated as the dominant barriers to readiness [9,10]. Whether this physical-function framework holds in the institutional setting, where residents' basic daily needs are already met by staff but their higher-order organizational capacity varies widely, has not been tested. In particular, no study has directly compared the independent predictive value of IADL capacity versus basic ADL (bADL) capacity for psychosocial disaster resilience among institutionalized older adults. Defining which functional domain carries this predictive weight is a necessary first step toward targeted, capacity-based preparedness interventions in residential care.

This cross-sectional study was designed to investigate the association between bADL capacity, IADL dependence, and psychosocial disaster resilience among older adults residing in nursing homes operated by a national humanitarian organization, with the ultimate goal of identifying actionable targets for evidence-based disaster preparedness interventions in geriatric populations.

Materials and Methods

Study Design and Setting

This cross-sectional, observational study was conducted in strict adherence to the STROBE guidelines [11]. The research took place across three nursing homes operated by a national humanitarian organization in two provinces of Türkiye. These institutions were strategically selected to provide a representative cross-section of the metropolitan and semi-urban institutional care landscape in Türkiye. The study protocol received formal approval from the Non-Interventional Clinical Research Ethics Committee of the participating institution. All procedures complied with the Declaration of Helsinki and its subsequent amendments. Written informed consent was obtained from all participants or their legally authorized representatives prior to data collection.

Selection of Participants

The source population comprised individuals aged 65 years and older residing in the aforementioned care facilities. Inclusion criteria were defined as follows: (1) chronological age ≥65 years, (2) sufficient verbal communication skills to comprehend and respond to questionnaire items, and (3) willingness to participate and provide informed consent. Exclusion criteria encompassed: (1) severe cognitive impairment (e.g., advanced dementia precluding questionnaire comprehension), (2) active psychiatric crisis, and/or (3) inability to communicate due to bedbound status. All residents meeting the inclusion criteria were invited to participate, yielding a final analytical cohort of 46 older adults.

Measurements and Outcomes

Data were systematically collected via standardized face-to-face interviews administered by trained research personnel experienced in geriatric assessments. The structured instrument evaluated three primary domains:

Baseline Demographics and Preparedness Status: Demographic variables included age, sex, and educational attainment (categorized as no formal education/primary school, middle/high school, and university/postgraduate). Preparedness variables assessed prior disaster education and specific preparatory actions taken, notably the possession of a dedicated emergency go-bag and the maintenance of essential documentation (e.g., emergency contact lists, medical history records, and current medication lists).

Functional Capacity: The degree of functional independence was quantified using an 11-item scale with a 5-point Likert response format (1=completely dependent, 5=completely independent). Items were stratified into two distinct domains: Basic Activities of Daily Living (bADL), encompassing mobility, bathing/showering, dressing, toileting, and personal hygiene; and Instrumental Activities of Daily Living (IADL), encompassing complex medication administration, financial management, meal preparation, telephone use, grocery shopping, housekeeping, and arranging transportation. Domain-specific scores were calculated as the mean of the respective item ratings.

Psychosocial Disaster Resilience (Primary Outcome): Participants' perceived self-efficacy in managing acute disaster

scenarios was measured using a complementary 7-item scale, also using a 5-point Likert format (1=completely unable, 5=completely able). The items assessed capacity for self-protection, resource acquisition, securing food/water, communicating with family/loved ones, managing disaster-related losses, emotional regulation, and re-establishing routine. A composite resilience score was calculated for each participant as the mean of the 7 items.

Statistical Analysis

The normality of continuous variables was evaluated using the Shapiro-Wilk test. Given the non-normal distribution of most continuous data, these variables are presented as medians with interquartile ranges (IQR). Categorical variables are reported as absolute frequencies and percentages. For bivariate analysis, the primary outcome variable (resilience score) was dichotomized using the median as the threshold: low resilience (<3.0) and high resilience (≥3.0). Group comparisons were executed using the Mann-Whitney U test for continuous variables and the chi-square or Fisher's exact test for categorical variables, as statistically appropriate.

Independent predictors of high disaster resilience were identified via multivariate logistic regression modeling. Variables demonstrating a p-value <0.20 in univariate analysis were selected for inclusion in the multivariate model. To mitigate the risk of data overfitting (a recognized hazard given the sample size constraints), the final multivariate model was strictly limited to a maximum of three clinically significant variables, adhering to standard epidemiological modeling practices of fewer than 1 predictor per 10 events [12]. Model discrimination was quantified using the C-statistic (area under the receiver operating characteristic curve [AUC]), and calibration was assessed via the Hosmer-Lemeshow goodness-of-fit test. The threshold for statistical significance was established at a two-tailed alpha <0.05. All analyses were performed using SPSS Statistics (IBM Corporation, Armonk, NY, USA) and R software (R Foundation for Statistical Computing, Vienna, Austria).

Results

Data Description and Preparedness Status A total of 46 older adults were included in the final analysis. The median age of the cohort was 80.5 years (IQR: 75.0–86.5), and 58.7% (n=27) were female. Educational distribution was as follows: primary school or less, 30.4% (n=14); middle/high school, 41.3% (n=19); and university/postgraduate, 28.3% (n=13).

A pronounced gap in practical disaster preparedness behaviors was observed. While 58.7% (n=27) of participants had previously received formal disaster awareness training, a mere 8.7% (n=4) actually possessed a dedicated emergency go-bag. Other action-based preparedness indicators were similarly deficient: only 45.7% possessed documented emergency contact information, 32.6% maintained accessible medical history records, and just 17.4% kept readily available, up-to-date medication lists.

Functional assessments revealed a stark divergence between physical autonomy and cognitive-organizational autonomy. The cohort demonstrated strong physical independence in bADL (median score=4.5; IQR: 3.6–5.0) but profound dependence in IADL, which require higher-order cognitive and executive function (median score=2.5; IQR: 1.9–3.4). Overall, the cohort's perceived psychosocial disaster resilience was moderate (median=3.0). Categorical dependency distributions were as follows: independent=45.7%; partially dependent=37.0%; and completely dependent=17.4%. Additional baseline characteristics stratified by resilience status are detailed in Table 1.

Univariate Analysis High disaster resilience exhibited no statistically significant association with age (p=0.178), sex (p=0.767), education level (p=0.634), or prior disaster training (p=0.345). Possession of an emergency go-bag was also not significantly correlated with resilience (p=1.000). Conversely, elevated functional capacity scores in both bADL and IADL domains demonstrated strong positive correlations with high resilience scores (p<0.001 for both). Univariate logistic regression corroborated these findings, indicating significant associations between high disaster resilience and both bADL (OR: 11.59; 95% CI: 2.01–66.70; p=0.006) and IADL (OR: 4.04; 95% CI: 1.83–8.94; p=0.001).

Multivariate Analysis and Model Fit Variables meeting the pre-specified inclusion threshold of p<0.20 from univariate analyses, specifically bADL and IADL, were entered into the multivariate logistic regression model. In the adjusted model, bADL capacity lost its statistical significance as an independent predictor of high disaster resilience (adjusted OR: 3.98; 95% CI: 0.72–22.03; p=0.114). In stark contrast, independence in IADL emerged as the sole significant independent predictor (adjusted OR: 2.53; 95% CI: 1.04–6.18; p=0.041). The results of the multivariate model are summarized in Table 2.

The multivariate model demonstrated strong discriminative ability, yielding a C-statistic (AUC) of 0.889, indicating that approximately 89% of participants were accurately classified regarding their resilience status based on the model (see Fig. 1). The Hosmer-Lemeshow test confirmed excellent model calibration (p>0.05).

A graphical representation illustrating the wide behavioral

Table 1. Baseline demographic and clinical characteristics of the study cohort stratified by disaster resilience level

Variable	All participants (n=46)	Low resilience (<3.0) (n=29)	High resilience (≥3.0) (n=17)	p
Age, Median (IQR)	80.5 (75.0–86.5)	84.0 (76.0–87.0)	80.0 (74.0–82.0)	0.178[a]
Sex (Female), n (%)	27 (58.7)	16 (55.2)	11 (64.7)	0.767[b]
Education Level, n (%)				0.634[b]
Illiterate / Primary school	14 (30.4)	9 (31.0)	5 (29.4)	
Middle / High school	19 (41.3)	13 (44.8)	6 (35.3)	
University / Postgraduate	13 (28.3)	7 (24.1)	6 (35.3)	
Prior Disaster Training (Yes), n (%)	27 (58.7)	15 (51.7)	12 (70.6)	0.345[b]
Emergency Kit Possession (Yes), n (%)	4 (8.7)	3 (10.3)	1 (5.9)	1.000[c]
Basic ADL Score, Median (IQR)	4.5 (3.6–5.0)	4.0 (3.0–4.5)	5.0 (4.8–5.0)	<0.001[a]
IADL Score, Median (IQR)	2.5 (1.9–3.4)	2.0 (1.6–2.6)	3.9 (2.7–4.7)	<0.001[a]

ADL: Activities of daily living; IADL: instrumental activities of daily living; IQR: Interquartile Range. [a]Mann-Whitney U test; [b]Pearson chi-square test; [c]Fisher exact test.

Table 2. Predictors of high disaster resilience: univariate and multivariable logistic regression analysis

Variable	Univariate OR (95% CI)	p	Adjusted OR (95% CI)	p
Age	0.96 (0.89–1.04)	0.336	—	—
Sex (Female)	0.69 (0.20–2.31)	0.545	—	—
Prior Disaster Training (Yes)	2.24 (0.63–8.00)	0.214	—	—
Basic ADL Score	11.59 (2.01–66.70)	0.006	3.98 (0.72–22.03)	0.114
IADL Score	4.04 (1.83–8.94)	0.001	2.53 (1.04–6.18)	0.041

ADL: Activities of daily living, CI: Confidence interval, IADL: Instrumental activities of daily living, OR: Odds ratio. Variables with p<0.20 in univariate analysis were included in the multivariable model. The multivariable model C-statistic (AUC) was 0.889.

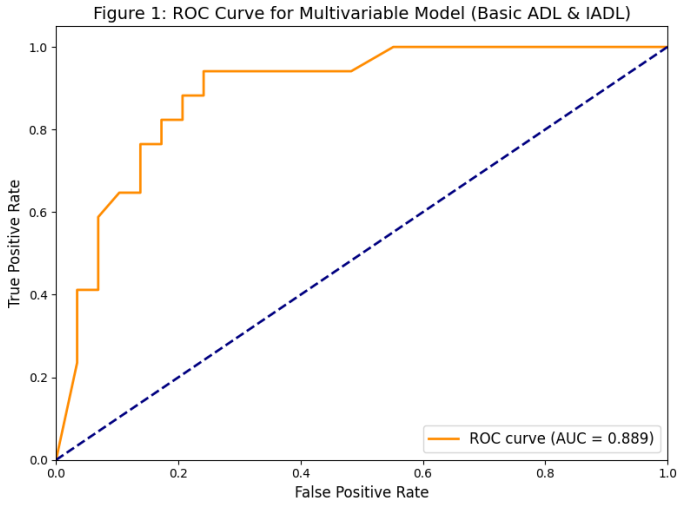

Figure 1. Receiver operating characteristic (ROC) curve demonstrating the discriminative ability of the multivariable logistic regression model (AUC=0.889) in predicting high psychosocial disaster resilience among institutionalized older adults, with instrumental activities of daily living (IADL) capacity as the primary predictor

gap between disaster awareness and actualized preparedness, depicting the stark discrepancy between older adults who received prior disaster training (58.7%) versus those maintaining a dedicated emergency go-bag (8.7%), is provided in Figure 2.

Discussion

This study empirically demonstrates that independence in instrumental activities of daily living (IADL) is the paramount independent predictor of psychosocial disaster resilience among institutionalized older adults, clearly exceeding the prognostic value of basic physical mobility. These findings directly challenge the prevailing model in disaster medicine, which traditionally anchors disaster readiness almost exclusively to physical ambulatory capability.

In addition, the observation that basic activities of daily living (bADL) independence (encompassing physical acts such as walking, dressing, and toileting) loses its predictive significance when controlling for IADL capacity carries profound clinical

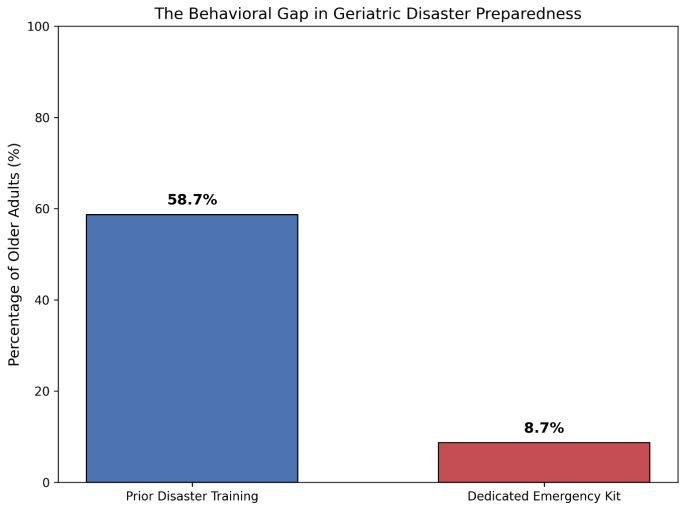

Figure 2. The behavioral gap in geriatric disaster preparedness. Bar chart illustrating the discrepancy between the proportion of older adults who received prior disaster awareness training (58.7%) and those maintaining a dedicated emergency kit (8.7%)

implications. It indicates that an older adult capable of physically exiting a structurally compromised building, yet incapable of independently managing complex medication regimens, locating vital documentation, or securing financial resources, remains just as vulnerable to the prolonged cascading effects of a disaster as an individual with profound physical disabilities. This phenomenon of "hidden dependence" is garnering increasing scrutiny in gerontological literature, as IADL deficits are recognized as early clinical markers of both cognitive decline and deteriorating adaptive capacity [5,6].

The critical behavioral gap identified in this cohort, in which nearly 59% of participants reported formal disaster education yet fewer than 10% maintained an emergency go-bag, mirrors the disconnect between knowledge acquisition and behavioral execution documented in broader international literature [7,13]. The persistence of this gap is particularly alarming in residential care settings, as it frequently engenders institutional complacency. Institutionalized older adults often harbor the subconscious assumption that facility management will unilaterally provide all necessary resources during an emergency, abrogating personal responsibility for preparedness [14]. During catastrophic, large-scale disasters where institutional infrastructure completely collapses, this absolute dependence on facility personnel rapidly transitions into a severe survival disadvantage.

The clinical urgency of these findings is amplified by Türkiye's severe seismic threat profile. The 2023 Kahramanmaraş earthquakes, the most devastating seismic event in Türkiye since 1999, caused unprecedented infrastructural collapse and catastrophic loss of life, starkly exposing systemic inadequacies in disaster preparedness across the entire population, particularly among highly vulnerable cohorts such as institutionalized older adults [8]. These realities mandate that institutional disaster protocols evolve beyond simplistic evacuation schematics to incorporate comprehensive, continuous assessments of residents' cognitive and organizational executive functions.

Several actionable intervention strategies emerge from these data. First, disaster preparedness education within residential care facilities must aggressively pivot from passive didactic lectures toward active, behavior-modifying modalities, using simulated stress drills [15]. Second, at the facility level, personalized emergency survival kits must be curated and maintained in direct correlation to a resident's specific IADL deficits. For example, older adults exhibiting deficits in medication management require automated, pre-sorted medication dispensers integrated into their go-bags [16]. Third, Psychological First Aid (PFA) modules should be systematically incorporated into routine institutional programming to dismantle the fatalistic attitudes that perpetuate the observed behavioral gap [17]. Fourth, micro-level evacuation algorithms must integrate each resident's unique IADL dependency curve, rather than relying exclusively on binary assessments of physical mobility. These recommendations align seamlessly with emerging international frameworks advocating a shift toward highly personalized, capacity-driven interventions, moving away from archaic "one-size-fits-all" approaches in geriatric disaster management [3,18].

Limitations

The methodological limitations of this study must be acknowledged. First, the cross-sectional design inherently precludes the establishment of temporal causality between functional independence and disaster resilience; longitudinal prospective studies are required to validate these causal pathways. Second, the reliance on self-reported questionnaire data introduces the potential for recall bias and social desirability bias, which may artificially inflate the reported frequency of preparedness behaviors or subjective resilience perceptions. Third, while the sample size of 46 was statistically sufficient for the constrained multivariate model deployed, it limits the statistical power and the broad generalizability of the findings to more heterogeneous, community-dwelling older adult populations. Fourth, unmeasured confounding variables, including the duration of institutionalization, the specific curriculum and quality of prior disaster training, pre-existing psychiatric comorbidities, and the baseline adequacy of the institution's structural disaster infrastructure, likely influenced the observed resilience scores.

Finally, the categorical thresholds used to define bADL/IADL dependency levels were empirically derived from the study data itself, lacking external validation against established, standardized classification systems.

Conclusion

In institutionalized older adults, physical independence does not equate to psychosocial disaster resilience. IADL capacity, which reflects both cognitive and organizational autonomy, was the strongest independent predictor of resilience in this cohort. A wide behavioral gap also separated disaster knowledge from practical preparedness actions. Emergency management policies and residential care protocols should move beyond mobility-based screening and passive education toward interventions that address the cognitive and organizational capacity of older residents.

Ethics

Ethics Committee Approval: This study was approved by the Göztepe Prof. Dr. Süleyman Yalçın City Hospital, Non-Interventional Clinical Research Ethics Committee (Decision No: 2026/0134, Date: 04.03.2026).

Informed Consent: Written informed consent was obtained.

Conflict of Interest: The authors declare no conflicts of interest.

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Data Availability Statement: The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

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