

Challenges and Adaptation after a Fall: A Mixed Methods Study of Community-Dwelling Older Adults Discharged Home from the Emergency Department

Michelle Lin

Stanford Medicine

David Kim

Stanford Medicine

Caitlin Toth¹

Stanford Medicine

Maria Pacella-LaBarbara

University of Pittsburgh

Brian Suffoletto

suffbp@stanford.edu

Stanford Medicine

Research Article

Keywords: fall, recovery, emergency department, social support, quality of life, intervention development, mixed methods

Posted Date: October 14th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-11079498/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Background.

Older adults discharged home after fall-related emergency department care may experience persistent physical, psychological, and social challenges, yet little is known about how they adapt during early recovery. We examined changes in patient-reported outcomes during the first 30 days after discharge and explored the strategies older adults used to manage their recovery.

Methods.

We conducted a prospective convergent mixed methods study of community-dwelling adults aged 65 years or older who were discharged home from a single academic emergency department after a fall. Participants completed measures of health-related quality of life, fear of falling, and psychological distress during the emergency department visit, with reference to their pre-fall status, and again after 30 days. Perceived social support was measured at follow-up. We described within-participant changes and used ordered logistic regression to examine the association between 30-day social support and pain severity, adjusting for retrospectively reported pre-fall pain. Semi-structured interviews conducted at 30 days were analyzed thematically using AI-assisted initial coding followed by human review and refinement.

Results.

Of 74 enrolled participants, 64 completed the 30-day assessment and 51 completed a follow-up interview. At 30 days, 31 participants (48%; 95% confidence interval [CI] 37–60%) reported worse pain, 32 (50%; 95% CI 38–62%) reported greater difficulty with mobility, and 19 (30%; 95% CI 20–42%) reported greater difficulty performing usual activities than before the fall. Forty-two participants (66%) reported lower overall health, and fear of falling increased in 32 (50%). Greater perceived social support at 30 days was associated with lower concurrent pain severity after adjustment for pre-fall pain (odds ratio 0.77 per 10-point increase; 95% CI 0.63–0.94). Interviews identified three domains of adaptation: behavioral and physical adaptation, psychological and cognitive adaptation, and social and relational support. Participants described both recovery-promoting strategies and responses that could restrict activity or independence.

Conclusions.

Many older adults reported persistent declines one month after fall-related emergency department discharge and described varied efforts to restore function, confidence, and independence. The findings support developing individualized post-discharge programs that integrate physical rehabilitation, psychological support, and social and care-navigation resources. The observed association between social support and pain was exploratory and requires longitudinal confirmation.

Background

Falls are a leading cause of emergency department (ED) visits¹ and subsequent morbidity and functional decline among older adults.² Most older adults evaluated after a fall are discharged directly home,³ leaving patients and their informal support networks to manage much of the recovery process. Research and intervention development following ED discharge have focused primarily on recurrent falls and other clinical outcomes.^{4,5} Less is known about how physical symptoms, psychological responses, and social circumstances interact during early recovery or how older adults respond to these challenges in daily life. Without this patient-level understanding, post-discharge interventions may not reflect individuals' changing needs, capabilities, and available support.

Patient-reported outcome measures (PROMs) can quantify changes in physical function, emotional health, and daily activities from the patient's perspective.⁶ Although PROMs are increasingly recommended for fall-care pathways,⁷ few studies have used them to characterize multidomain change during the first month after ED discharge.⁸ PROMs also provide limited insight into how older adults interpret these changes, make decisions, and adapt their behavior. Qualitative studies have identified physical, psychological, and social dimensions of the post-fall experience⁹ and described barriers during transitions from emergency to community care.¹⁰ However, these approaches have rarely been integrated to connect early changes in health with the adaptive processes older adults use after returning home. Such integration may inform intervention development because responses such as heightened caution, activity restriction, or reliance on others may promote safety in some circumstances but contribute to deconditioning, isolation, or loss of confidence in others.

We therefore conducted a prospective convergent mixed methods study of community-dwelling older adults discharged home after a fall-related ED visit. Our objectives were to characterize changes in health-related quality of life, fear of falling, and psychological distress during the first 30 days of recovery; identify the behavioral, cognitive, emotional, and relational adaptations participants used; and integrate these findings into a patient-informed framework for post-fall intervention development. We hypothesized that participants would report poorer health-related quality of life and greater fear of falling and psychological distress relative to retrospectively reported pre-fall status. We also examined whether perceived social support at 30 days was associated with health outcomes measured concurrently. Drawing on Stress and Coping Theory¹¹ and the Fear-Avoidance Model,¹² we integrated the quantitative and qualitative findings to identify potential intervention targets and principles for tailoring multidimensional support after ED discharge.

Methods

Study design

We conducted a single-center, prospective convergent mixed methods cohort study of community-dwelling older adults who received fall-related care in an emergency department (ED) and were

discharged home. The Stanford University Institutional review board approved the study (protocol number:75718). All participants provided written informed consent before enrollment.

Setting and participants

A convenience sample of participants were recruited between July 22 and November 7, 2024, from an academic ED in Northern California with approximately 100,000 visits annually. Recruitment occurred primarily 9a-10p during weekdays. Patients were eligible if they were aged 65 years or older, presented after a fall or with an injury caused by a fall, spoke English, were medically stable, and were expected to be discharged home. We excluded patients who lived in a skilled nursing facility, were non-ambulatory, or were unable to provide informed consent. Capacity to consent was determined by treating physicians. Participants received a \$25 gift card.

Study procedures

During the ED visit, participants completed a survey covering demographic characteristics, medical history, fall circumstances, pain location, and retrospectively reported pre-fall health-related quality of life, fear of falling, and psychological distress. The standardized patient-reported outcome measures were previously published and are cited in the Measures section. Participants also completed a body map indicating pain both prior to their fall (retrospective recall) and at the time of the ED visit. At 30 days, research staff contacted participants by telephone to reassess health-related quality of life, fear of falling, and psychological distress; measure perceived social support; and ascertain the number of falls since ED discharge. Participants were also invited to complete a semi-structured telephone interview about their recovery and the ways they had adapted after the fall. The study team developed the semi-structured interview guide specifically for this study before recruitment. Questions were informed by the study objectives, previous research on post-fall recovery,⁹ and the team's clinical and qualitative research experience. The English-language interview guide is provided in Supplementary File 1. Principal questions addressed how participants managed their injuries, how they perceived their recovery, their concern about falling again, and any changes they had made to reduce their risk of another fall. Interviews were conducted by two trained research associates. Interviews lasted 15 minutes and were audio recorded. Recordings were transcribed using Whisper software (OpenAI),¹³ after which a member of the research team compared each transcript with the recording and corrected transcription errors. Identifying information was removed before analysis.

Measures

Assessment timing. During the ED assessment, participants reported their status before the index fall in response to questions beginning, "Prior to your fall...." At the 30-day assessment, the corresponding questions used the timeframe, "Since your fall...." The pre-fall assessments were therefore retrospective and should not be interpreted as measurements obtained before the fall.

Fall circumstances. Following recommendations for documenting falls,^{14,15} participants reported the date, time, location, context, and presumed cause of the index fall, as well as whether it involved a head strike or loss of consciousness.

Pain location. Participants indicated areas of pain or injury using the Collaborative Health Outcomes Information Registry Body Map, a validated visual instrument containing 74 anterior and posterior body regions.¹⁶ Participants completed two maps during the ED visit: one based on recalled pain before the fall and another reflecting pain at the time of assessment. For each region, we calculated the proportion of participants reporting pain and the percentage-point difference between the two assessments. The body map was not repeated at 30 days because it could not be administered during the telephone assessment.

Health-related quality of life. We administered four of the five EQ-5D-5L dimensions: mobility, self-care, usual activities, and pain or discomfort.¹⁷ Each dimension has five ordinal response levels ranging from no problems to extreme problems or inability to perform the activity. We did not administer the anxiety or depression dimension because psychological distress was assessed separately with the Patient Health Questionnaire-4. We analyzed the four administered dimensions separately and did not calculate an EQ-5D index score. Participants also rated their overall health using the EQ visual analogue scale, ranging from 0, representing the worst imaginable health, to 100, representing the best imaginable health.

Fear of falling. Fear of falling was measured using the seven-item Short Falls Efficacy Scale–International.¹⁸ Total scores range from 7 to 28, with higher scores indicating greater concern about falling during daily activities.

Psychological distress. We measured psychological distress using the Patient Health Questionnaire-4, a four-item screening measure for symptoms of anxiety and depression.¹⁹ Total scores range from 0 to 12. The two-item anxiety and depression subscales each range from 0 to 6, with a score of 3 or greater indicating a positive screen.

Social support. At the 30-day assessment, participants completed the eight-item modified Medical Outcomes Study Social Support Survey.²⁰ Raw scores range from 8 to 40 and were transformed to a scale from 0 to 100, with higher scores indicating greater perceived support. Because social support and follow-up health outcomes were measured concurrently, analyses involving social support were cross-sectional.

Quantitative analysis

We summarized participant characteristics and study measures using means and standard deviations, medians and interquartile ranges, or counts and percentages, as appropriate. We compared baseline characteristics between participants who did and did not complete follow-ups using chi-squared tests. For each body-map region, we calculated the percentage-point difference in pain endorsement between retrospectively reported pre-fall pain and pain reported during the ED visit. For each administered EQ-5D-

5L dimension, we compared the retrospective pre-fall and 30-day responses among participants with paired observations. Change was classified as improved, unchanged, or worsened and was also displayed using ordinal transition matrices. For the Short Falls Efficacy Scale–International, Patient Health Questionnaire-4, and visual analogue scale, we calculated paired mean or median changes and corresponding 95% confidence intervals. We also calculated the proportion of participants meeting the positive-screen threshold for each Patient Health Questionnaire-4 subscale. We conducted exploratory analyses of the associations between perceived social support and each PRO measured at 30 days using pairwise correlations. Because pain was the only outcome associated with social support in the initial analyses, we fitted an ordered logistic regression model with 30-day EQ-5D-5L pain as the dependent variable and 30-day social support and retrospectively reported pre-fall pain as independent variables. Social-support coefficients and odds ratios were expressed per 10-point increase on the 0–100 scale. We assessed the proportional-odds assumption and calculated robust standard errors. Post-estimation margins were used to estimate the probability of each pain category at the sample’s 25th percentile, median, and 75th percentile of social support. We then estimated pairwise differences in the probability of the highest pain category across these values. Analyses were conducted using complete observations for each outcome. Statistical tests were two-sided, with an alpha level of 0.05. Analyses were performed using Stata 15.0.

Qualitative analysis

De-identified transcripts were analyzed using a hybrid human–AI inductive thematic analysis approach. An initial codebook was generated by prompting a large language model (Claude Sonnet 5, Anthropic) with a subset of transcripts and the study’s three semi-structured interview probes, requesting both descriptive and interpretive codes organized into a hierarchical theme–cluster–code structure. The research team reviewed and revised this draft codebook, adding and re-specifying codes based on domain expertise (e.g., separating rehabilitation/reconditioning behaviors from general safety strategies). The finalized codebook was then applied by the same model across all 52 transcripts at the utterance level, with each participant turn (or discrete clause within a longer turn) assigned one or more codes. The authors read the transcripts to become familiar with the data and reviewed the proposed codes against the source text. The research team revised or rejected codes, examined the relationships among clusters, reviewed candidate themes for internal coherence and distinction, and selected quotations to illustrate the final interpretation. The authors retained responsibility for all analytic decisions; no AI-generated code, theme, interpretation, or quotation was accepted without human review.

Mixed methods integration

Quantitative and qualitative data were collected during the same 30-day follow-up period and analyzed separately. Integration occurred during interpretation. We compared changes in patient-reported outcomes with participants’ descriptions of behavioral, psychological, and social adaptation, identifying areas of convergence, complementarity, and [if applicable] divergence. We then organized the integrated

findings into a conceptual model linking post-fall experiences and adaptive responses with potential targets for post-discharge intervention development. The model was reviewed and refined by the study team.

Results

Participant recruitment, enrollment and follow-up

Between July 22 and November 7, 2024, we identified 257 ED patients with a fall-related chief complaint. Of these, 131 were excluded because they were not medically stable or not being discharged home. We conducted in-person screens for 126, and among whom 74 were enrolled. Among those enrolled, 64 completed the 30-day follow-up assessments and 51 completed the interview. See Fig. 1.

Participant characteristics

The enrolled cohort had a mean age of 78.0 years (SD 7.6), and 64.9% were female. The majority were White (83%), female (65%), and 43% lived alone. Comparison of cohort characteristics at baseline and follow-ups are shown in Table 1.

Fall circumstances

Falls were most often reported to occur on the day of ED presentation (62%) and commonly took place in the morning or afternoon. Indoor falls at home were most frequent (35%). Common activities included walking on level (37%) or uneven ground (34%), and 74% of falls involved a head strike. See **Supplemental Table 1** for details on the falls.

Change in Pain across the Body

The percentage of participants marking pain in at least one body region increased from 35% (26/74) pre-fall to 92% (68/74) post-fall. Pre-fall pain was concentrated almost exclusively in the low back (endorsed by 11–15% of participants), whereas post-fall pain was far more diffusely distributed across the body. The largest increases in endorsement were in the face/forehead (+ 16 to + 18 percentage points), low back (+ 11 to + 12 percentage points), and, to a lesser extent, the knees and hands (Fig. 2).

Change in EQ-5D Components

From baseline (pre-fall) to 30 days post-fall, participants reported worse mobility (50%), self-care (23%), and ability to perform usual activities (30%), and increased pain (48%) (See Fig. 3). While 39% reported mobility problems prior to their fall, that proportion rose to 75% at 30 days. Most participants (86%) reported no difficulty with self-care prior to their fall, which declined to 75% at 30 days. Similarly, 77% had no problems with usual activities prior to their fall, dropping to 56% at follow-up. The percentage of patients reporting pain increased from 40% pre-fall to 75% at follow-up. Additionally, mean overall health score (VAS) fell from 80 to 75; 66% of participants reported any decline in overall health.

Change in Fear of Falling

Fear of falling increased modestly over the 30-day period following the fall-related ED visit from 11.5 (SD = 4.3) at baseline to 12.7 (SD = 5.1) at 30 days. Half of participants reported an increase in fear of falling over this period.

Change in Psychological Distress

For anxiety symptoms, the proportion of participants screening positive for anxiety (subscale score ≥ 3) increased from 16.2% (12/74) at baseline to 18.9% (12/64) at 30 days, and 43.8% (28/64) of participants with paired baseline and 30-day assessments reported an increase in anxiety symptoms over follow-up. For depression symptoms, the proportion of participants screening positive for depression (subscale score ≥ 3) was similar at baseline (13.5%, 10/74) and at 30 days (14.1%, 9/64), while 25.0% (16/64) of participants with paired baseline and 30-day assessments reported an increase in depressive symptoms over follow-up.

Social support

Social support was overall high, with a median score of 88 (IQR 64, 100). In an ordered logistic regression model adjusting for baseline pain severity (Table 2), higher social support was associated with significantly lower 30-day pain severity ($\beta = -2.59$, robust SE = 1.03, $p = 0.012$; odds ratio [OR] = 0.77 per 10-point increase on the 0–100 social support scale, 95% CI 0.63–0.94). Relative to participants with no pain at baseline, those with extreme baseline pain had significantly higher odds of more severe pain at 30 days (OR = 5.87, 95% CI 1.08–31.98, $p = 0.041$); those with moderate baseline pain did not differ significantly from those with no baseline pain (OR = 1.99, 95% CI 0.69–5.77, $p = 0.202$). The overall model was statistically significant (Wald $\chi^2(3) = 11.35$, $p = 0.010$; pseudo $R^2 = 0.10$).

Predictive margins showed a dose-response pattern: the estimated probability of no pain at 30 days rose from 17.9% to 28.1% to 34.6% as the social support score increased from 64.1 to 87.5 to 100 (of a possible 0–100), while the estimated probability of extreme pain fell correspondingly from 29.0% to 19.0% to 14.8%; the probability of moderate pain changed little across this range (53.2%, 53.0%, 50.6%). Pairwise comparisons confirmed that the predicted probability of extreme pain was significantly lower at higher social support levels (64.1 vs. 87.5: $\Delta = -10.0$ percentage points, $p = 0.015$; 64.1 vs. 100: $\Delta = -14.2$ percentage points, $p = 0.009$; 87.5 vs. 100: $\Delta = -4.2$ percentage points, $p = 0.002$).

Falls after discharge. Fourteen participants (22%; 95% CI 14–33) reported at least one further fall within 30 days, five of them two or more falls (6/37, 3/12 and 5/15 among those with 0, 1 and 2 + falls in the prior year).

Thematic Analysis: A total of 51 participants completed semi-structured interviews at 30-day follow-up, generating 527 analyzable utterances. Through inductive thematic analysis, we identified three higher-order themes: (1) Behavioral and Physical Adaptation, (2) Psychological and Cognitive Adaptation, and (3) Social and Relational Support. **Supplemental Table 2** summarizes themes, clusters, and codes.

Theme 1: Behavioral and Physical Adaptation. This theme encompassed 240 utterances across three clusters: Behavioral Adaptation (n = 104), Safety Strategies (n = 91), and Symptom Management (n = 45).

Behavioral Adaptation. Participants most commonly described increased caution in daily movement (n = 61): "Every time I stand up, I just pause for a minute and just make sure that I'm not feeling dizzy" (Interview 46). A substantial subset described structured rehabilitation and reconditioning efforts (n = 34), ranging from formal physical and cardiac therapy to self-directed exercise: "I had already been participating in a cardiac rehabilitation which is strong exercise... on a structured basis that two days a week" (Interview 12). Several participants described this rehabilitation as restoring confidence as much as function: "It's actually found it quite helpful and just practicing how to stand... practicing that has helped me feel more confident actually" (Interview 10). This positive framing was not universal — one participant discontinued prescribed physical therapy mid-course, citing stress and self-directed alternatives: "I've been having them three times a week until this past week... I've just not even gone once... I don't even need to go there anymore" (Interview 8).

Safety Strategies. Assistive devices were the most frequently reported strategy in the entire sample (n = 58), spanning canes, walkers, trekking poles, grab bars, and traction footwear: "I do have a cane that I walk with now, so it's a little bit more secure" (Interview 67). Adoption was sometimes gradual or initially resisted: "It was hard at first... my daughter bought it for me, and I didn't want to do it" (Interview 57). Home modifications (n = 14) and activity avoidance (n = 17) were less common but present: "We've installed railings and things like that to reduce that risk" (Interview 53); "I'm not climbing stairways right now... I use the elevator until I'm healed" (Interview 4).

Symptom Management. Participants managed ongoing pain (n = 19), dizziness (n = 16), and weakness (n = 10) through self-care and monitoring: "I take a Tylenol and tell myself to sit down and raise my leg" (Interview 66). Others described adapting routines around persistent symptoms: "When I said I got a little dizzy getting up at the theater... I'm going to give myself... one, two, three... before being ready" (Interview 20).

Theme 2: Psychological and Cognitive Adaptation. This theme included 182 utterances across three clusters: Recalibration and Growth (n = 51), Fear and Concern (n = 80), and Coping and Acceptance (n = 51).

Fear and Concern. Concern about future falls was elicited directly by our interview probe and therefore present, at some level, in nearly every interview; responses ranged from minimal to severe. Some participants minimized concern: "I'm not too concerned... it was just me being foolish" (Interview 60, paraphrased tone). Others reported moderate concern tied to a specific mechanism: "I'm moderately concerned... I use a walker to prevent falls" (Interview 57). Several expressed pronounced anxiety, particularly where symptoms such as dizziness or presyncope persisted: "I definitely worry about falling now. Much more... I think it has left an impression forever in my head now" (Interview 5). Fear also extended to family members: "My wife thought I was dead when this instance happened. And it has created a huge shock in her head" (Interview 18). A smaller subset described independence-related

concerns distinct from fear of the fall event itself — worry about becoming a burden or losing autonomy: "I am now much more trepidatious about... I can see now where I am possibly going to be socially isolated in the future" (Interview 9).

Coping and Acceptance. Participants described a range of coping responses, from frustration and self-blame — "I'm annoyed with myself... there was no good reason" (Interview 2) — to religious or philosophical framing: "Whenever I feel any stress, I talk to my God and I pray" (Interview 4). Several participants explicitly framed acceptance as an adaptive strategy: "It's not good or bad, it just happened. And I took care of it" (Interview 20); "Acceptance is the best way to deal with this disease. I can't make it go away... but I do have it" (Interview 19).

Recalibration and Growth. Participants described a shift in self-perception following the fall, most often characterized as a loss and gradual rebuilding of confidence: "One loses confidence, I guess... it's almost as if your body feels weaker" (Interview 10). Some reframed the fall as clarifying or protective: "It kind of heightens your awareness... you can't let down your guard" (Interview 54); one participant described the event in explicitly positive terms: "I was actually kind of grateful for the fall in the sense that it really reminded me that I need to be very careful" (Interview 52).

Theme 3: Social and Relational Support. This theme comprised 105 utterances across two clusters: Social Support (n = 48) and Health Agency and Advocacy (n = 57).

Social Support. Family involvement was the most commonly reported source of support (n = 27): "My wife helps me... she reminds me when I get up" (Interview 46). Friends (n = 13) and broader community ties (n = 8) were also described as sources of both practical help and normalization: "When I discussed this with my friends... they've started sharing their experiences" (Interview 18).

Health Agency and Advocacy. Participants frequently described actively seeking medical follow-up (n = 31), the single most common code in this theme: "I called and said, 'Listen, guys, I need to do this sooner'... they told me... 'we just had a cancellation'" (Interview 55). A smaller number explicitly advocated for their own care or reflected on gaps in it: "Should I have requested my whole leg be X-rayed at the very first?" (Interview 9); "I advocated for myself, and I'm very glad" (Interview 55).

Discussion

This convergent mixed methods study characterizes the complex, multidimensional recovery experiences of older adults discharged from the ED after a fall. Participants reported declines in mobility, self-care, and pain-related functioning, alongside increased fear of falling and psychological distress. Qualitative analysis enriched these findings by revealing dynamic processes of adaptation across physical, psychological, and social domains. Together, these findings indicate that falls are transformative experiences that reshape daily routines, personal identities, and perceptions of aging. They also show that social support may ameliorate some of the effects of falls on pain outcomes.

Participants reported physical impairments that persisted beyond the acute period. The proportion reporting difficulty walking rose from 39% pre-fall to 75% at 30 days, difficulty with self-care rose from 14% to 25%, and difficulty with usual activities rose from 23% to 44%. Qualitative narratives captured diverse behavioral adaptations to these declines, from assistive device use to structured home exercise programs, consistent with what Lazarus and Folkman described as problem-focused coping¹¹. For some, these adaptations promoted recovery and confidence (pro-recovery adaptations); for others, they led to activity restriction and physical deconditioning (anti-growth adaptations), illustrating the tension between safety and re-engagement that characterizes adaptive risk navigation after a fall.

The psychological impact of falls varied widely. Fear of falling increased in half of participants, and PHQ-4 screening indicated that a substantial minority worsened on both subscales over follow-up (44% for anxiety, 25% for depression). Qualitative accounts helped contextualize this variability: some participants described persistent fear, uncertainty, or frustration, consistent with the Fear-Avoidance Model¹², while others engaged in psychological reappraisal, drawing on gratitude, mindfulness, or spiritual beliefs consistent with emotion-focused coping. Cognitive and emotional adaptations included both pro-recovery strategies (mindful awareness, acceptance, planning) and anti-growth responses (hypervigilance, avoidance, resignation). Resilience was not static, but emerged through ongoing self-assessment, reflection, and emotional recalibration, consistent with prior work conceptualizing resilience as a dynamic process rather than a fixed trait²².

Social connections were also found to be an important component of recovery. Each 10-point increase in social support score was associated with 23% lower odds of a more severe pain category at 30 days, independent of baseline pain severity. This finding challenges the assumption that recovery after a fall is governed primarily by biomechanical factors and suggests that, consistent with our prior work²³, social support plays a role in recovery. Qualitative accounts were consistent with this pattern: participants who withdrew from social participation described isolation compounding their distress, whereas those who received peer support, family encouragement, and positive interactions with providers described these relationships as restoring confidence and role identity. Together, these findings suggest that social isolation warrants the same systematic screening in post-fall care that pain, mobility, and fear of falling already receive.

Potential intervention components in the acute recovery period across physical, psychological, and social connection targets are shown in Fig. 4. Intervention components targeting physical rehabilitation should combine individually prescribed, monitored, and adjusted strength, balance, and gait exercises following clinical guidelines.²⁴ Objective feedback from pedometers, wearable sensors, or remote monitoring, as used in activity-promotion interventions^{25,26}, may complement self-report and help tailor goals, pacing, and reinforcement, with clear pathways for clinical assessment when pain, dizziness, weakness, or functional decline persists or worsens. In addition to physical activity and exercise components, ambulation aids may provide an important adjunct. Prior small trial has shown that provision of ambulation aids in the ED with training can improve life-space mobility and reduce fear of

falling in older adults.²⁷ Our findings add that assistive-device coaching should specifically address the ambivalence and identity threats that may affect engagement.

Psychological intervention should distinguish adaptive, time-limited protective behavior from fear-driven avoidance that perpetuates disability; use collaboratively planned, graded re-engagement with meaningful activities to strengthen self-efficacy; and incorporate cognitive reappraisal, coping planning, and relapse-prevention strategies responsive to heterogeneous recovery trajectories. Meta-analyses have shown that psychological interventions improve pain self-efficacy²⁸ and reduce fear of falling²⁹.

Social support intervention components should begin with systematic screening for isolation and caregiver needs, since neither is likely to surface without direct assessment. Where existing family or community networks are identified, care teams should actively activate them. At the same time, formal support should supplement rather than replace these relationships; participants who described support as most helpful framed it in terms of restored confidence and role identity rather than dependency, suggesting that interventions should reinforce existing relationships rather than substitute clinical or paid support for them. Social prescribing³⁰, which connects patients to non-clinical community resources such as exercise groups, meal programs, or volunteer visiting services, and structured peer-support models³¹, in which individuals who have navigated their own fall recovery mentor new patients, offer scalable, lower-cost strategies for reaching older adults who live alone or otherwise lack accessible family support.

Limitations

This study has several limitations. Our cohort was predominantly White, English-speaking, and community-dwelling, which may limit generalizability to more diverse or medically complex populations. We had some loss to follow-up; however, we did not find significant baseline differences between those who completed follow-up and those lost to it. We used retrospective pre-fall measurements, as we were unable to assess patients prior to their fall, which could have introduced recall bias. Our sample size also limited the power of quantitative analyses to test moderated or mediated pathways using structural models. Finally, the proposed intervention targets and design principles are derived from observational and interview data and remain conceptual; we did not develop or test a multicomponent intervention in this population. Co-design and prospective evaluation are needed to determine feasibility, acceptability, safety, and effectiveness.

Conclusion

Falls among community-dwelling older adults produce multidimensional disruptions that extend beyond physical injury. Recovery is shaped by a dynamic interplay of physical adjustment, emotional processing, and social interaction; our findings suggest these domains are interrelated rather than independent, as reflected in the observed association between social support and pain outcomes. Recognizing older adults as active agents in recovery, rather than passive recipients of care, may be key to fostering

resilience, improving functional outcomes, and supporting sustained independence. Interventions developed from older adults' accounts should integrate physical recovery, psychological support, and social connection, while balancing safety with autonomy and re-engagement.

Declarations

Ethics approval and consent to participate:

The Stanford University Institutional Review Board approved the study (protocol number 75718). All study procedures were performed in accordance with the Declaration of Helsinki and relevant guidelines and regulations. All participants provided written informed consent before enrollment.

Consent for publication:

Not Applicable

Clinical trial number

not applicable

Funding:

Department of Emergency Medicine, Stanford University

Author Contribution

ML: Methodology, Data curation, Writing – original draft, Writing – review & editing
DK: Methodology, Data curation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing
CT: Conceptualization, Methodology, Data curation, Investigation, Writing – original draft
MP: Conceptualization, Methodology, Writing – original draft, Writing – review & editing
BS: Conceptualization, Methodology, Data curation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Supervision, Project administration, Funding acquisition

Data Availability

The surveys and transcripts that support the findings of this study are available upon request and with the permission of Stanford University and proof of IRB approval.

References

1. Carpenter CR, Cameron A, Ganz DA, Liu S. Older Adult Falls in Emergency Medicine: 2019 Update. *Clin Geriatr Med*. 2019;35(2):205–19. 10.1016/j.cger.2019.01.009.
2. Liu SW, Obermeyer Z, Chang Y, Shankar KN. Frequency of ED revisits and death among older adults after a fall. *Am J Emerg Med*. 2015;33(8):1012–8. 10.1016/j.ajem.2015.04.023.
3. Blomaard LC, Mooijaart SP, van Meer LJ, et al. Geriatric screening, fall characteristics and 3- and 12 months adverse outcomes in older patients visiting the emergency department with a fall. *Scand J Trauma Resusc Emerg Med*. 2021;29:43. 10.1186/s13049-021-00859-5.
4. Conneely M, Leahy S, Dore L, et al. The effectiveness of interventions to reduce adverse outcomes among older adults following Emergency Department discharge: umbrella review. *BMC Geriatr*. 2022;22(1):462. 10.1186/s12877-022-03007-5.
5. Charmant W, Jansen S, van Schoor NM, de Vries R, Nanayakkara P, Willems HC, van der Velde N. Emergency department-initiated interventions to reduce risk of recurrent falls in older adults: a systematic review and meta-analysis. *Age Ageing*. 2026;55(8):afag227. 10.1093/ageing/afag227.
6. Churrua K, Pomare C, Ellis LA, et al. Patient-reported outcome measures (PROMs): A review of generic and condition-specific measures and a discussion of trends and issues. *Health Expect*. 2021;24(4):1015–24. 10.1111/hex.13254.
7. Liu JB, Bates DW. Patient-reported outcome measures in emergency and acute care: looking beyond the emergency room. *Clin Exp Emerg Med*. 2024;11(1):1–5. 10.15441/ceem.23.172.
8. Hammouda N, Carpenter CR, Hung WW, et al. Moving the needle on fall prevention: A Geriatric Emergency Care Applied Research (GEAR) Network scoping review and consensus statement. *Acad Emerg Med*. 2021;28(11):1214–27. 10.1111/acem.14279.
9. Jiang H, Yuan H, Tee S, Lam Nogueira OCB. Perspectives and experiences of community-dwelling older adults who experience falling: A qualitative meta-synthesis. *Int J Nurs Sci*. 2024;11(2):276–85. 10.1016/j.ijnss.2024.03.009.
10. Gettel CJ, Serina PT, Uzamere I, et al. Emergency department-to-community care transition barriers: A qualitative study of older adults. *J Am Geriatr Soc*. 2022;70(11):3152–62. 10.1111/jgs.17950.
11. Folkman S, Lazarus RS. An analysis of coping in a middle-aged community sample. *J Health Soc Behav*. 1980;21(3):219–39.
12. Lethem J, Slade PD, Troup JD, Bentley G. Outline of a Fear-Avoidance Model of exaggerated pain perception—I. *Behav Res Ther*. 1983;21(4):401–8. 10.1016/0005-7967(83)90009-8.
13. <https://openai.com/index/whisper/>
14. Pernes M, Agostinho I, Bernardes RA, Belo Fernandes J, Baixinho CL. Documenting fall episodes: a scoping review. *Front Public Health*. 2023;11:1067243. 10.3389/fpubh.2023.1067243.
15. Kehrer-Dunlap AL, Randolph SB, Samih MS, Lewis SK, Bollinger RM, Poiter C, Foster ER. Toward An Improved Reporting of Fall Circumstances Among Community-Dwelling Older Adults: A Systematic Review and Reporting Guide for the 6 W's of Falls. *J Frailty Sarcopenia Falls*. 2026;11(3):192–243. 10.22540/JFSF-11-192.

16. Scherrer KH, Ziadni MS, Kong JT, Sturgeon JA, Salmasi V, Hong J, Cramer E, Chen AL, Pacht T, Olson G, Darnall BD, Kao MC, Mackey S. Development and validation of the Collaborative Health Outcomes Information Registry body map. *Pain Rep.* 2021;6(1):e880. 10.1097/PR9.0000000000000880.
17. EuroQol Group. EuroQol—a new facility for the measurement of health-related quality of life. *Health Policy.* 1990;16(3):199–208. 10.1016/0168-8510(90)90421-9.
18. Kempen GJIM, Yardley L, van Haastregt JCM, et al. The Short FES-I: a shortened version of the falls efficacy scale-international to assess fear of falling. *Age Ageing.* 2008;37(1):45–50. 10.1093/ageing/afm157.
19. Kroenke K, Spitzer RL, Williams JBW, Löwe B. An ultra-brief screening scale for anxiety and depression: the PHQ-4. *Psychosomatics.* 2009;50(6):613–21. 10.1176/appi.psy.50.6.613.
20. Moser A, Stuck AE, Silliman RA, Ganz PA, Clough-Gorr KM. The eight-item modified Medical Outcomes Study Social Support Survey: psychometric evaluation showed excellent performance. *J Clin Epidemiol.* 2012;65(10):1107–16. 10.1016/j.jclinepi.2012.04.007.
21. Angevaere MJ, Roberts J, van Hout HPJ, Joling KJ, Smalbrugge M, Schoonmade LJ, Windle G, Hertogh CPM. Resilience in older persons: A systematic review of the conceptual literature. *Ageing Res Rev.* 2020;63:101144. 10.1016/j.arr.2020.101144.
22. Brienza A, Suffoletto BP, Kuhn E, et al. The role of specific sources of social support on postinjury psychological symptoms. *Rehabil Psychol* Published online August. 2021;16. 10.1037/rep0000388.
23. Avin KG, Hanke TA, Kirk-Sanchez N, McDonough CM, Shubert TE, Hardage J, Hartley G, Academy of Geriatric Physical Therapy of the American Physical Therapy Association. Management of falls in community-dwelling older adults: clinical guidance statement from the Academy of Geriatric Physical Therapy of the American Physical Therapy Association. *Phys Ther.* 2015;95(6):815–34. 10.2522/ptj.20140415.
24. Wu S, Li G, Du L, Chen S, Zhang X, He Q. The effectiveness of wearable activity trackers for increasing physical activity and reducing sedentary time in older adults: A systematic review and meta-analysis. *Digit Health.* 2023;9:20552076231176705. 10.1177/20552076231176705.
25. Suffoletto B, Mayer W, Toth C, Ashenburg N, Lin M, Losak M, Kim D. Evaluation of a text message + pedometer intervention to increase steps after emergency department discharge: a pilot study. *Aging Clin Exp Res.* 2025;37(1):131. 10.1007/s40520-025-03030-7.
26. Polesel FS, Denadai S, Morinaga CV, Madalena IC, Aliberti MJR, Henrique EA, de Andrade-Junior MC, Nucci RAB, Yamaguti WP, Curiati PK, Righetti RF. Walking Aids and Locomotion Training in the Emergency Department: A Randomized Clinical Trial. *JAMA Netw Open.* 2025;8(11):e2544535. 10.1001/jamanetworkopen.2025.44535.
27. Martinez-Calderon J, Flores-Cortes M, Morales-Asencio JM, Fernandez-Sanchez M, Luque-Suarez A. Which Interventions Enhance Pain Self-efficacy in People With Chronic Musculoskeletal Pain? A Systematic Review With Meta-analysis of Randomized Controlled Trials, Including Over 12 000 Participants. *J Orthop Sports Phys Ther.* 2020;50(8):418–430. 10.2519/jospt.2020.9319. Erratum in: *J Orthop Sports Phys Ther.* 2022;52(1):52. doi: 10.2519/jospt.2022.52.1.52.

28. Zijlstra GA, van Haastregt JC, Ambergen T, van Rossum E, van Eijk JT, Tennstedt SL, Kempen GI. Effects of a multicomponent cognitive behavioral group intervention on fear of falling and activity avoidance in community-dwelling older adults: results of a randomized controlled trial. *J Am Geriatr Soc.* 2009;57(11):2020–8. 10.1111/j.1532-5415.2009.02489.x.
29. Bickerdike L, Booth A, Wilson PM, Farley K, Wright K. Social prescribing: less rhetoric and more reality. A systematic review of the evidence. *BMJ Open.* 2017;7(4):e013384. 10.1136/bmjopen-2016-013384.
30. Smith-Turchyn J, Sinclair S, O’Loughlin EK, et al. A pilot randomized controlled trial of a virtual peer-support exercise intervention for female older adults with cancer. *BMC Geriatr.* 2024;24(1):887. 10.1186/s12877-024-05495-z.

Tables

Table 1
Baseline characteristics

Variable	Enrolled Cohort (N = 74)	Completed follow-up assessments (n = 64)	Completed follow-up interview (n = 51)
Age			
Mean (SD)	78.0 (7.6)	78.4 (7.5)	78.1 (7.4)
75 and older	47 (63.5)	41 (64.1)	33 (64.7)
Sex			
Male	26 (35.1)	23 (35.9)	17 (33.3)
Female	48 (64.9)	41 (64.1)	34 (66.7)
Race			
White	61 (82.5)	51 (79.6)	41 (80.3)
Black	1 (1.3)	1 (1.6)	1 (2.0)
Asian	11 (14.9)	11 (17.2)	8 (15.7)
Other	1 (1.3)	1 (1.6)	1 (2.0)
Hispanic ethnicity	2 (2.7)	2 (3.1)	2 (3.9)
Relationship Status			
Single (never married)	15 (20.3)	14 (21.9)	9 (17.7)
Married or in a domestic partnership	35 (47.3)	30 (46.9)	24 (47.1)
Separated	1 (1.3)	1 (1.6)	1 (2.0)
Divorced	7 (9.5)	5 (7.8)	5 (9.7)
Widowed	16 (21.6)	14 (21.8)	12 (23.5)
Co-habitation			
Lives by self	32 (43.2)	26 (40.6)	21 (40.4)
Lives with one person	33 (44.6)	29 (45.3)	22 (43.4)
Lives with multiple people	9 (12.2)	9 (14.1)	8 (15.4)
Medical history categories (self-reported)			

Variable	Enrolled Cohort (N = 74)	Completed follow-up assessments (n = 64)	Completed follow-up interview (n = 51)
Age			
Cardiac	35 (47.3)	29 (45.3)	22 (43.1)
Respiratory	15 (20.3)	13 (20.3)	11 (21.6)
Gastrointestinal	10 (13.5)	9 (14.1)	8 (15.7)
Endocrine	22 (29.7)	19 (29.7)	14 (27.5)
Musculoskeletal	42 (56.8)	36 (56.3)	28 (54.9)
Neurological	12 (16.2)	9 (14.1)	7 (13.7)
Visual problems	16 (21.6)	15 (23.4)	13 (25.5)
Vertigo	8 (10.8)	8 (12.5)	5 (9.8)
Orthostatic hypotension	6 (8.1)	6 (9.4)	5 (9.8)
Seizures	1 (1.3)	1 (1.6)	1 (2.0)
CVA	5 (6.7)	5 (7.8)	4 (7.8)
Falls in past 12 month			
None	40 (54.0)	37 (57.8)	31 (60.8)
One	17 (23.0)	12 (18.8)	8 (15.7)
Two+	17 (23.0)	15 (23.4)	12 (23.5)

Table 1 Legend: Abbreviations SD (standard deviation); CVA (cerebrovascular accident). Percentages across categories may not add up to 100% given rounding.

Table 2
Ordered Logistic Regression Predicting 30-Day EQ-5D Pain/Discomfort Severity

Predictor	Coefficient (SE)	OR (95% CI)	p
Social support score (per 10-point increase, 0–100 scale)	-0.259 (0.103)	0.77 (0.63–0.94)	0.012
Baseline pain/discomfort (ref: none)			
Moderate vs. none	0.691 (0.541)	1.99 (0.69–5.77)	0.202
Extreme vs. none	1.769 (0.865)	5.87 (1.08–31.98)	0.041
Threshold parameters			
κ_1 (cut 1)	-2.864 (0.912)	—	—
κ_2 (cut 2)	-0.269 (0.854)	—	—

Note. $N = 64$. Model: ordered logistic regression with robust standard errors. Wald $\chi^2(3) = 11.35$, $p = 0.010$; pseudo $R^2 = 0.10$. OR = odds ratio; CI = confidence interval; SE = standard error. Social support measured with the MOS Social Support Survey total score (0–100 scale); coefficient and OR reflect a 10-point increase. Outcome (EQ-5D-5L pain/discomfort at 30 days) coded 1 = no problems, 2 = moderate problems, 3 = extreme problems; reference category for baseline pain is “no problems.”

Figures

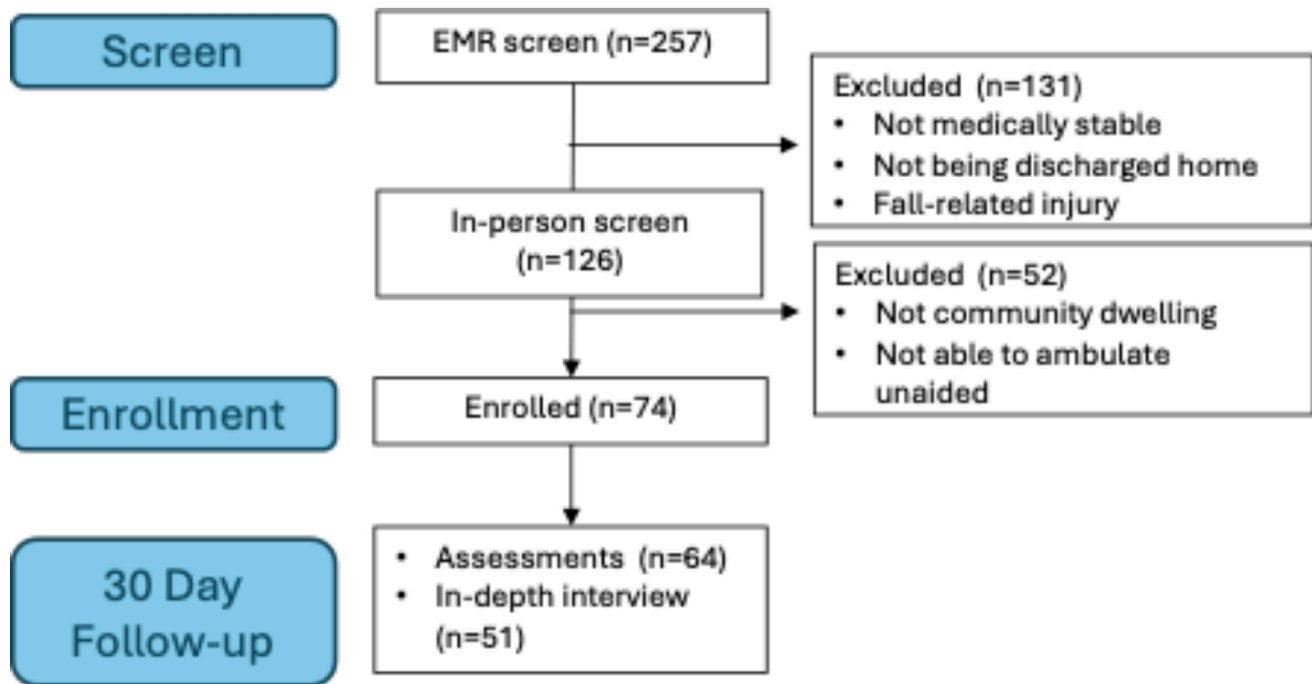


Figure 1

Participant Flow Diagram

Legend: EMR=electronic medical record

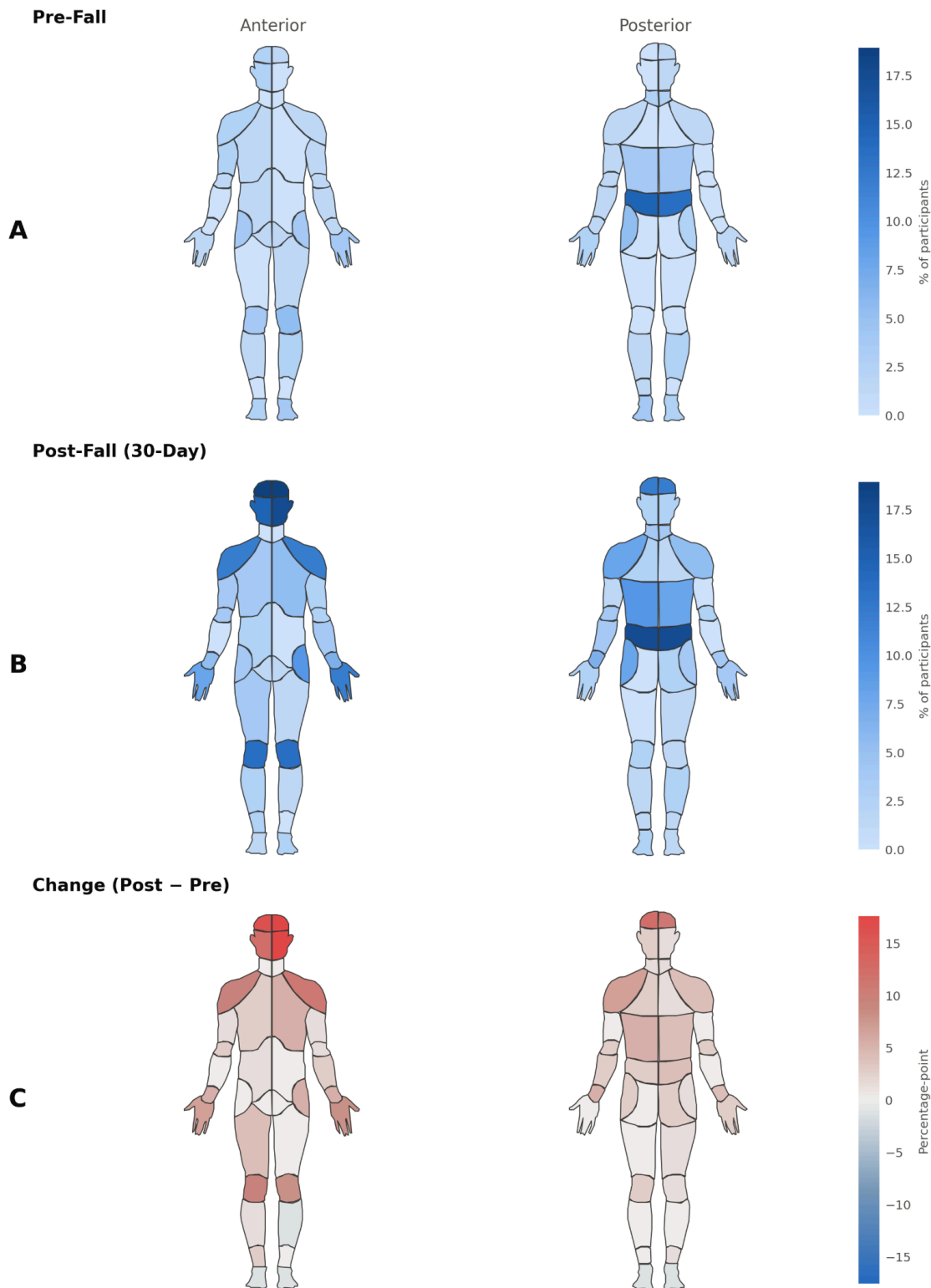


Figure 2

Change in Pain Location from Pre- to Post-Fall

Legend: All CHOIR body pain maps (pre- and post-fall) were completed in the ED. For pre-fall body pain maps, participants were asked to recall the locations of pain they had prior to the most recent fall. For post-fall body pain maps, they were asked to indicate all areas on their body with pain NOW.

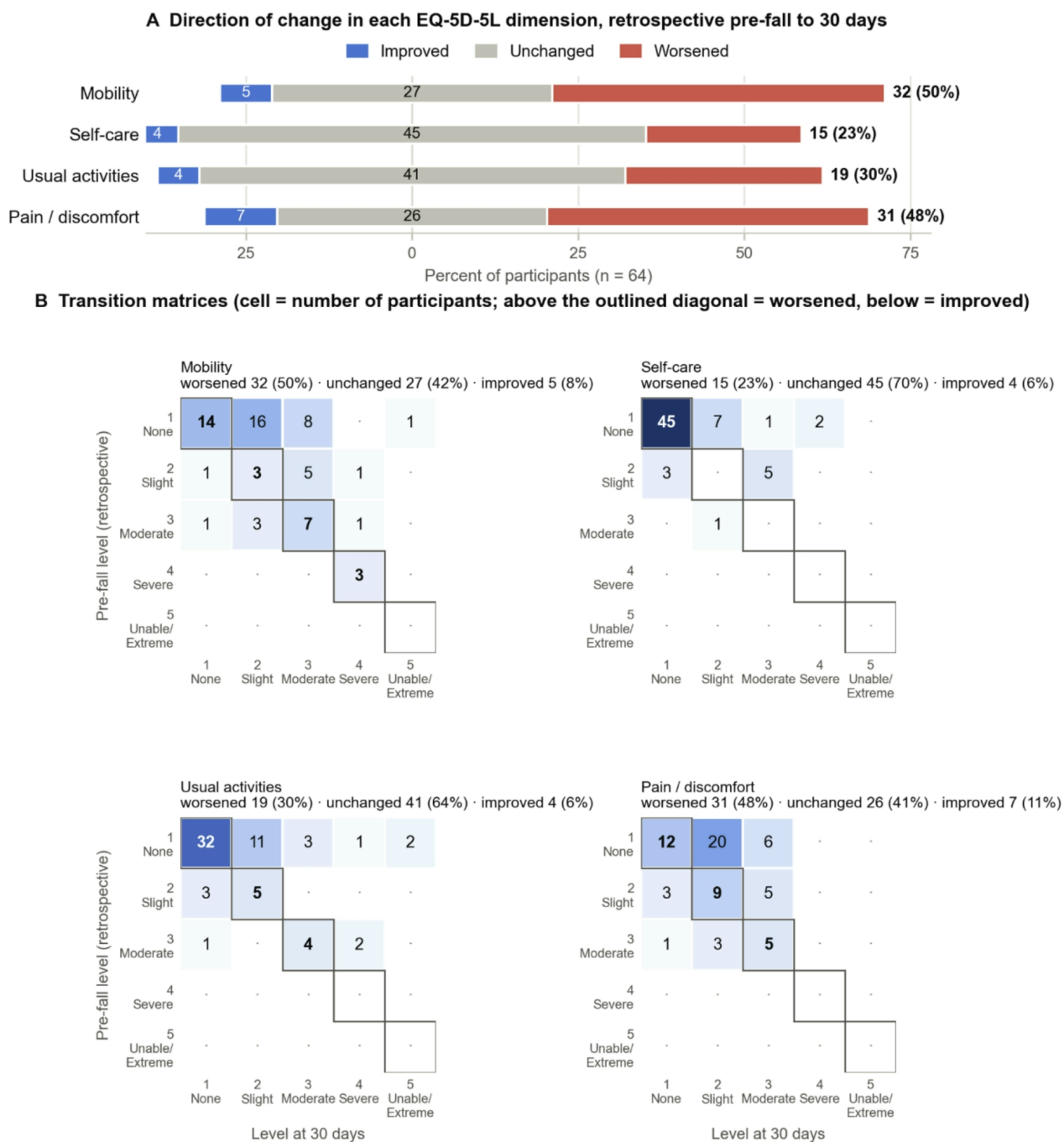


Figure 3

Change in EQ-5D Components at Baseline and 30 Day Follow-up

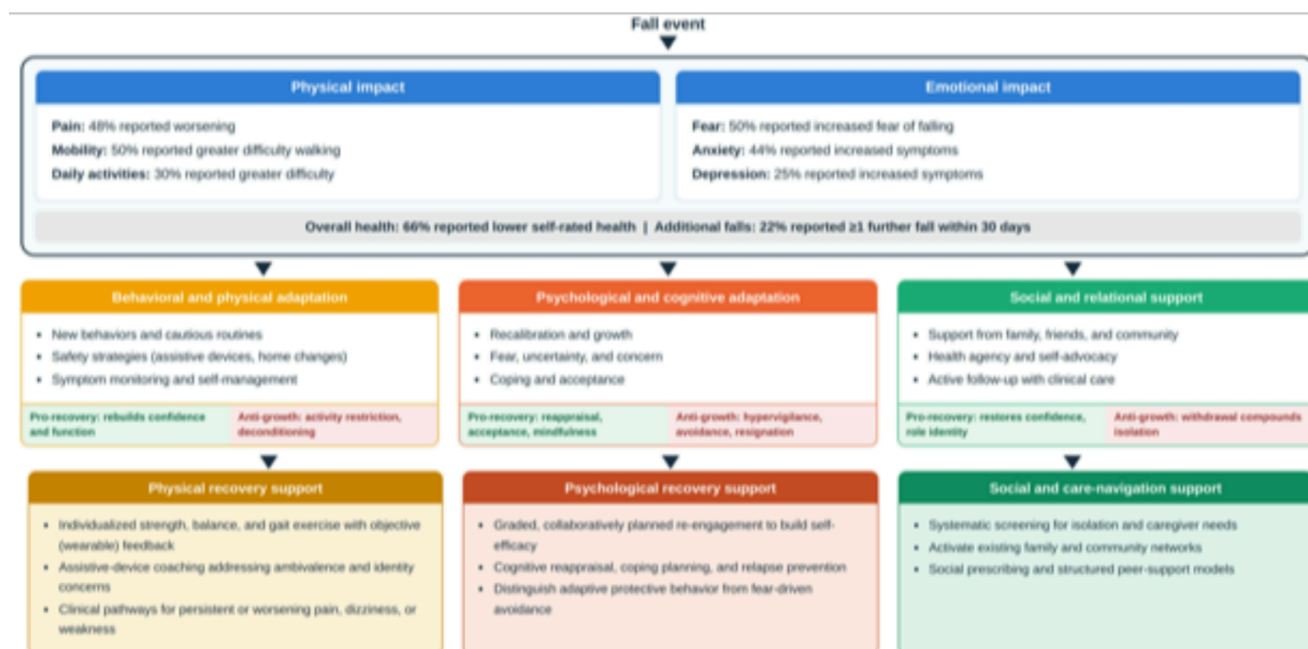


Figure 4

Integrated Conceptual Model

Legend: Integrated conceptual model translating the three domains of post-fall adaptation identified in this study (behavioral/physical, psychological/cognitive, and social/relational) into intervention targets and cross-cutting development principles for patient-centered post-fall recovery support.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [CAREFULSupplementalMaterials.docx](#)