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Research

One-year stability in care needs, activities of daily living, and daily-life cognitive function among very old adult day service users in Japan

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Abstract

Background: Adult day services support community-based long-term care for older adults, yet participant-level longitudinal evidence from repeated routine monitoring remains limited. **Aims:** To describe one-year stability in care needs level, activities of daily living (ADL), and daily-life cognitive function among very old adult day service users in Japan, and secondarily to summarize baseline-to-one-year changes using routine Japan's Long-Term Care Information System for Evidence (LIFE) data. **Method:** We conducted a retrospective descriptive study of 62 continuing users of a single adult day service who had complete quarterly assessments at baseline, and at 3, 6, 9, and 12 months in LIFE. **Results:** Care needs level remained stable in 54 of 62 participants (87.1%; 95% CI, 76.6–93.3), ADL in 56 of 62 participants (90.3%; 95% CI, 80.5–95.5), and daily-life cognitive function in 50 of 62 participants (80.6%; 95% CI, 69.1–88.6). Baseline-to-one-year changes were small (Cohen's d = 0.21, 0.24, and 0.35, respectively). **Conclusions:** One-year stability was common among very old continuing adult day service users. These findings do not establish service effectiveness, but suggest that maintenance may be a clinically meaningful outcome in routine community-based long-term care.

Keywords

Aged; Adult Day Care Centres; Activities of Daily Living; Long-Term Care; Cognition; Japan

Introduction

Japan is experiencing rapid population ageing, and community-based long-term care services have become increasingly important for supporting ageing in place. Adult day services are a key part of this care landscape and typically combine health monitoring, assistance with daily activities, exercise, bathing, meals, social participation, and cognitively stimulating programmes. Prior literature suggests that adult day services may support continued community living and functional independence, but much of the published evidence has focused on caregiver outcomes, service use, or conceptual frameworks rather than repeated participant-level trajectories observed in routine practice.[1-5] This gap is especially relevant for very old adults with established care needs, because marked short-term improvement may be less realistic than maintaining function and avoiding accelerated decline. Functional decline in activities of daily living, cognitive impairment, and reduced social participation are all linked to greater care dependency, institutional transition, and loss of community tenure in later life.[6-9]

Japan's Long-Term Care Information System for Evidence (LIFE) is a national routine data system used in Japanese long-term care services.[10,11] It supports standardized monitoring of users' physical function, cognitive function, care needs, and related care information within the public long-term care insurance system. For adult day services, LIFE provides repeated routine assessments that can be used not only for care planning and quality improvement, but also for describing longitudinal patterns in real-world service users. Because similar national monitoring systems may not be familiar to international readers, LIFE should be understood here as a standardized routine-care data source rather than as a research-specific assessment programme.

Therefore, the primary objective of this study was to describe one-year stability in care needs level, ADL, and daily-life cognitive function among very old continuing users of a single adult day service in Japan. The secondary objective was to summarize baseline-to-one-year mean changes in these three outcomes within a complete one-year observation window defined by five quarterly LIFE assessments. The study was not designed to evaluate the causal effectiveness of adult day service use, but to clarify what repeated routine monitoring can reveal about maintenance and gradual change in very old users receiving ongoing community-based care.

Method

Study design and participants

This retrospective observational study analysed continuing users of a single adult day service in Japan.

Eligible participants had routine LIFE assessments available at baseline and at 3, 6, 9, and 12 months. Eligibility, therefore, required continued service use and complete quarterly routine assessments across the observation year. A total of 62 participants met these criteria, and no participant meeting the prespecified inclusion criteria was excluded.

The design was intentionally descriptive. The analysis used all eligible participants with complete routine follow-up rather than a selected subsample. Because the study did not include a comparison group, the main purpose was to characterise one-year maintenance and change within routine care rather than to estimate a causal treatment effect.

Restricting the cohort to continuing users with complete quarterly observations had two implications. First, it allowed all three outcomes to be described using the same denominator across the entire year, thereby avoiding ambiguities created by intermittent observation. Second, it made the analytic question closely aligned with routine case review in practice, where teams often ask whether continuing users are broadly stable across repeated assessments. At the same time, this design necessarily means that the findings describe a selected subgroup of users who remained in service long enough to contribute a complete annual follow-up.

Adult day service context

The service delivered routine community-based day care for older adults with care needs. Usual care included health monitoring, bathing assistance, group physical exercise, meals, recreational activities, and cognitively stimulating programmes such as reminiscence-oriented activities and communication-based tasks. These elements reflected ordinary service provision rather than a protocolised intervention.

This contextual description is important because the manuscript is intended as a descriptive report of routine care. The study does not attempt to attribute observed stability to any single service component. Instead, it describes participant trajectories during ongoing exposure to the overall day-service environment and its usual multidisciplinary care practices.

Measures

Japan introduced a mandatory public long-term care insurance system in 2000 to support older adults with functional dependency. Eligibility and care needs level are determined through a nationally standardised certification process administered by municipal governments. The resulting care needs level reflects overall dependency and required care time rather than a single physical or cognitive attribute alone[10]. This makes it useful for routine care planning, but also means that a modest change in one functional domain may not immediately alter the certified category.

The certification process combines structured information on physical function, cognitive status, behavioural symptoms, and medical needs, together with an algorithm that estimates the overall time required for care. Final certification is reviewed by the municipality and translated into an administrative care needs level. The resulting level is therefore clinically meaningful in service planning, but it is broader and less domain-specific than an instrument focused solely on physical function or cognition.

LIFE assessments were conducted as part of routine care quality monitoring under national long-term care insurance standards[10,11]. Care needs level was obtained from the municipal certification record at each time point. Under Japan's long-term care insurance system, the care needs level is an ordinal administrative classification reflecting the degree of care dependency. In the present cohort, care needs level was recorded as Care Level 1 to Care Level 5, with higher levels indicating greater dependency and greater estimated care requirements.

Activities of daily living were assessed using the Barthel Index recorded within LIFE. The Barthel Index ranges from 0 to 100, with higher scores indicating greater independence in basic daily activities. It is widely used in geriatric and rehabilitation settings because it captures practical dependence in feeding, transfers, grooming, toileting, bathing, mobility, stairs, dressing, bowel control, and bladder control. In the present study, the Barthel Index was treated as a routine functional indicator rather than as a study-specific outcome instrument.

Because the Barthel Index and the daily-life cognitive function scale capture different but related aspects of everyday performance, using them together alongside the care needs level makes it possible to examine whether administrative care dependency, physical function, and cognition in daily life change in parallel or diverge over time. This multi-metric view was particularly relevant in a very old cohort, in which subtle decline may first appear in only one domain.

Daily-life cognitive function was assessed using the LIFE daily-life cognitive function scale. Unlike screening tests designed for case finding, this scale reflects cognition as expressed in everyday functioning, including comprehension, communication, judgement, decision making, and behavioural appropriateness in daily situations.[11] It therefore captures functional cognition in routine care rather than providing a clinical diagnosis of dementia. This distinction matters because subtle deterioration in cognition expressed during daily care may become visible before a higher certified care needs level is assigned. The LIFE daily-life cognitive function scale ranges from 0 to 35, with higher scores indicating better preserved cognitive function in everyday situations.

Ethics and informed consent

This study was approved by the SI Research Institute Ethics Committee, Tokyo, Japan (Approval No. 009). The study used anonymized secondary routine-care data derived from LIFE. The requirement for individual written informed consent was waived by the committee because the study involved retrospective analysis of sufficiently anonymized existing records and no direct participant contact.

Because the research team did not contact participants and did not access identifiable data, assessment of participants' decision-making capacity was not applicable to the present secondary analysis. Safeguards for confidentiality included de-identification before analysis and reporting only aggregated results.

Statistical analysis

The primary outcome was one-year stability in care needs level, ADL, and daily-life cognitive function, defined as unchanged status from baseline to 12 months. Participants were classified as improved, stable, or worsened for each outcome, and the proportions in each category were calculated. For the three principal stability proportions, 95% confidence intervals were calculated using Wilson's score intervals.

For descriptive categorisation, a lower care needs level at one year was treated as improvement and a higher level as worsening. For ADL and daily-life cognitive function, higher scores indicate better function; therefore, increases were treated as improvement and decreases as worsening. This operational definition was chosen to keep the primary summaries clinically transparent and directly interpretable for routine care review.

As secondary descriptive analyses, baseline-to-one-year mean changes were summarised for each outcome, and effect sizes (Cohen's d) were calculated. Because the care needs level is an ordinal administrative classification, interpretation focused primarily on the improved/stable/worsened categories rather than mean change. Given the descriptive aim, the small cohort size, and the absence of a comparison group, the analysis emphasised descriptive summaries rather than causal inference. No missing data were imputed because inclusion already required complete quarterly observations. All analyses were performed using HAD, version 18.0.[12]

Formal significance testing was not emphasized because the study was not designed to make confirmatory causal inferences, and the small single-center cohort limited precision for subgroup or model-based analysis. The aim was instead to present transparent descriptive summaries that could be understood by clinicians, care managers, and service teams without relying on complex statistical modelling.

Results

Participant characteristics

The mean age of participants was 85.4 years, and 48 participants (77.4%) were female. The average number of attendance days per month was 11.1. The average care needs level, ADL score, and daily-life cognitive function score were 1.90, 83.5, and 26.8, respectively (Table 1). The cohort, therefore, represented very old adults with established care needs who were receiving regular community-based day care.

One-year stability in care needs level, ADL, and daily-life cognitive function

Over one year, most participants remained stable across all three outcomes (Table 2). Care needs level was unchanged in 54 participants (87.1%; 95% CI, 76.6–93.3), improved in 1 (1.6%), and worsened in 7 (11.3%). ADL was unchanged in 56 participants (90.3%; 95% CI, 80.5–95.5), improved in 1 (1.6%), and worsened in 5 (8.1%). Daily-life cognitive function was unchanged in 50 participants (80.6%; 95% CI, 69.1–88.6) and worsened in 12 (19.4%), with no participants showing improvement.

Table 1. Characteristics of participants (n = 62)

Variables	Stat
Age, mean ± SD	85.4 ± 6.6
Female, n (%)	48 (77.4)
Average attendance days per month, mean ± SD	11.1 ± 4.7
Care needs level*, mean ± SD	1.90 ± 1.0
ADL, Barthel Index**, mean ± SD	83.5 ± 19.0
Daily-life cognitive function***, mean ± SD	26.8 ± 7.4

ADL = activities of daily living; * range 1–5; higher = greater dependency; ** range 0–100; higher = greater independence: *** range 0–35; higher = better function

Table 2. One-year change in care needs level, ADL, and daily-life cognitive function

Outcome	Improved n (%)	Stable n (%)	95% CI for stable	Worsened n (%)
Care needs level	1 (1.6)	54 (87.1)	76.6–93.3	7 (11.3)
ADL	1 (1.6)	56 (90.3)	80.5–95.5	5 (8.1)
Daily-life cognitive function	0 (0.0)	50 (80.6)	69.1–88.6	12 (19.4)

Note: 95% CI: confidence intervals were calculated for the principal stability proportions using Wilson's score intervals. For care needs level, a lower level at one year was classified as improvement and a higher level as worsening; for ADL and daily-life cognitive function, higher scores indicate better function.

Secondary descriptive change over one year

Standardized baseline-to-one-year changes were small across outcomes (Cohen's d = 0.21 for care needs level, 0.24 for ADL, and 0.35 for daily-life cognitive function). The largest mean change was observed for daily-life cognitive function, whereas changes in care needs level and ADL were modest. These mean-difference summaries should be interpreted as secondary descriptive findings, while the improved/stable/worsened categories remain the primary basis for interpretation.

Interpretive summary of the descriptive pattern

The differing patterns across outcomes are also noteworthy. Administrative care needs level and ADL were highly stable, whereas daily-life cognitive function showed a somewhat greater tendency to worsen. This suggests that cognition expressed in everyday functioning may be a comparatively sensitive domain for detecting early change in very old continuing users, even when certified care dependency or basic physical function appears broadly stable. Taken together, the results indicate that one-year maintenance was common in this cohort of continuing users, although cognition in daily life appeared more vulnerable to gradual change than ADL or certified care needs level.

Internal consistency of the descriptive pattern

The descriptive pattern was internally coherent across the three measures. Improvement was rare, which is unsurprising in a very old cohort with established dependency. At the same time, outright deterioration was not the dominant pattern for any outcome. The results, therefore, do not suggest dramatic recovery, but they also do not suggest pervasive decline during the observation year. Instead, they portray a maintenance-oriented profile in which stability predominated and worsening was concentrated most visibly in cognition expressed in everyday life.

Discussion

Main findings

This descriptive single-center study examined one-year stability in care needs level, ADL, and daily-life cognitive function among very old continuing users of an adult day service in Japan. The main finding was that most participants remained stable in care needs level and ADL over one year, while daily-life cognitive function showed a somewhat greater tendency to worsen. These results should not be interpreted as evidence that adult day service use caused stability. Rather, they provide a participant-level description of maintenance and gradual change during routine community-based long-term care.

Why maintenance matters in a very old cohort

The clinical meaning of these findings is tied to the age and dependency profile of the cohort. In very old adults already living with established care needs, maintenance is often a meaningful outcome in its own right. For such users, avoiding abrupt decline, preserving basic independence in daily activities, and sustaining cognitive function sufficiently for ongoing community living may be more realistic goals than expecting pronounced improvement. The present results should therefore be read against a maintenance-oriented clinical horizon rather than against a rehabilitation model that assumes frequent recovery of function.

Interpretation of care needs level, ADL, and daily-life cognitive function

The findings are clinically relevant because, in very old adults with established care needs, maintenance may be an important outcome. Marked short-term improvement may not be realistic for many users, whereas avoidance of accelerated decline, preservation of basic ADL, and timely recognition of cognitive change are meaningful goals for care planning. The partial divergence between stable care needs level, stable ADL, and more frequent worsening in daily-life cognitive function also suggests that these measures are complementary rather than interchangeable. In particular, cognition expressed in everyday situations may show early change even when the administrative care needs level and basic ADL remain broadly stable.

Value of repeated routine monitoring

The use of repeated LIFE assessments is a practical strength of this report. Standardized routine monitoring can help care teams review whether users remain stable, identify emerging decline, and set realistic maintenance-oriented goals. However, in the present concise report, the five quarterly assessments were used primarily to define a complete one-year observation window and to support baseline-to-one-year classification. Temporary within-year fluctuations were not separately modelled, and future studies with larger samples should examine more detailed longitudinal trajectories.

Complementary rather than interchangeable measures

Another useful implication is that these three outcomes should not be treated as interchangeable. Care needs level reflects administrative care dependency, ADL reflects basic physical function, and the LIFE daily-life cognitive function scale reflects cognition as manifested in everyday behaviour. Their partial divergence in the present study indicates that longitudinal monitoring benefits from looking across domains rather than relying on a single metric. For multidisciplinary teams, this multi-domain view may help distinguish broadly stable care dependency from emerging vulnerability in functional cognition.

Relation to prior work and scope of inference

These findings also complement broader conceptual and practice-oriented discussions of adult day services, ageing in place, and function in later life.[13,14] In that sense, the

present manuscript adds participant-level longitudinal evidence to a literature that has often been stronger on programme concepts, service aims, or care philosophy than on repeated routine monitoring of very old users. The present analysis is based on participant-level routine monitoring data and should therefore be read as empirical evidence that is complementary to, rather than overlapping with, prior conceptual or practice-oriented discussions.

The study is intentionally modest in its claims. Because the cohort consisted only of continuing users with complete quarterly follow-up, the results should not be generalised to all adult day service users or interpreted as evidence that routine attendance caused stability. Instead, the value of the report lies in showing how maintenance-oriented outcomes can be described transparently in a real-world service using standardised national data. That kind of descriptive evidence may be especially useful for services caring for very old people, where clinicians, care managers, and families are often trying to judge whether a situation is remaining acceptably stable rather than whether large gains are occurring.

Strengths

The study has several practical strengths. It used standardized national routine-care data, captured the same participants at five repeated time points across 12 months, and focused on outcomes that are directly relevant to day service teams, including the administrative care needs level, ADL, and cognition in daily life. In addition, the descriptive analytic strategy was aligned with the design and sample size, reducing the risk of overstating what a small single-center cohort can support.

Transferability of the descriptive approach

Although the certification categories and LIFE scales used here are specific to Japan, the broader descriptive approach may still be useful in services that collect repeated routine information on dependency, function, and cognition. The present study should therefore be interpreted as context-specific in its measures but potentially instructive in its maintenance-oriented use of routine monitoring data.

Limitations

This study also has important limitations. First, it was a single-center study of 62 continuing users, limiting external validity and introducing possible selection bias. Second, the observational design without a comparison group precludes causal inference regarding the effects of adult day service use. Third, the cohort was restricted to users who continued service use and had complete quarterly LIFE assessments over one year. Therefore, the reported stability proportions may overestimate maintenance among all adult day service users. The anonymized analytic dataset did not include sufficient information on users who discontinued service, were hospitalized, became institutionalized, died, or lacked complete quarterly assessments. This limits the interpretation of maintenance as a clinical outcome, because users with poorer trajectories may have been less likely to remain in the analysable cohort. Fourth, the care needs level in Japan's long-term care insurance system is an administrative classification rather than a direct clinical scale. Fifth, the LIFE daily-life cognitive function scale reflects cognition in everyday functioning and does not provide a clinical diagnosis of dementia. Sixth, although five quarterly assessments were available, this descriptive report did not separately model interim temporary changes during the year. Finally, temporary within-year changes were not separately modelled in this concise descriptive report.

Conclusion

In this descriptive single-center study of very old continuing adult day service users in Japan, most participants maintained a stable care needs level and ADL over one year, while daily-life cognitive function showed somewhat greater vulnerability to decline. These findings do not demonstrate service effectiveness, but they suggest that maintenance is a clinically meaningful outcome in routine community-based long-term care. Repeated routine monitoring may help care teams recognize gradual change and align care planning with realistic goals for very old users.

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