

Title page

(i) Title:

Age-related change in gait efficacy and predictors of its decline: a 3 years longitudinal study

Running title: The predictors of gait efficacy decline

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Abstract

Aim: This study aimed to calculate the minimal clinically important difference (MCID) for a modified Gait Efficacy Scale (mGES) over 3 years and to clarify the predictors of mGES decline.

Methods: In total, 87 community-dwelling older adults were enrolled in this 3-year longitudinal study. The mGES, fall history, and physical function (chair stand frequency, open-eyes one-leg stand, open-close stepping test, walking speed, walking endurance [shuttle stamina walk test], and physical activity) were assessed at baseline. After a 3-year follow-up period, the mGES and Global Rating of Change Scale were assessed. The MCID was calculated using anchor-based methods, with the Global Rating of Change Scale as an anchor. The participants were classified into the decline and keep groups based on whether the changes in the mGES were greater than the MCID. A logistic regression analysis was conducted using the mGES as the dependent variable and physical characteristics, fall history, and physical function as independent variables.

Results: The MCID for the mGES over 3 years was -7.38 points. A logistic regression analysis identified low open-close stepping (odds ratio, 0.87; 95%confidence interval, 0.782–0.985; $P=0.027$) and the shuttle stamina walk test (odds ratio, 0.974; 95%confidence interval, 0.949–1.000; $P=0.049$) as predictors of the mGES decline.

Conclusion: These findings suggest that a change of 7.38 points in the mGES was clinically significant and poor agility and walking endurance can predict future decline in the mGES.

Key Words

community-dwelling, longitudinal study, minimal clinically important difference, older adults, self-efficacy

Text

Introduction

In the current super-aging society, it is important to assess risk factors for detecting physical function decline at an earlier stage in older adults. In addition to objective measurements, such as gait speed and lower limb muscle strength, patient-reported subjective measurements are emphasized in clinical settings.^{1,2} Self-efficacy,³ which indicates one's level of confidence in engaging in a certain action, has recently attracted attention as a factor related to individual behavioral changes in the field of medical care and welfare. Self-efficacy for physical activity is thought to be associated with gait or activities of daily living (ADL) ability and fall incidence, especially in older adults.⁴⁻⁷

The modified Gait Efficacy Scale (mGES) is an assessment of self-efficacy that consists of a 10-items measure of the walking conditions commonly encountered even in community-dwelling older adults, and also confirmed the validity and reliability of the Japanese edition.⁷ Although fall-related efficacy has been reported to associate with age,⁸ it is unclear how much the mGES declines with age. Furthermore, when evaluating psychological changes, it is generally recommended to determine the effect of change not only based on statistical significance, but also on the minimal clinically important difference (MCID) calculated by anchor-based methods.^{9,10} However, no study has investigated the MCID for mGES, and the clinically significant difference in mGES in community-dwelling older adults is unclear.

In addition, previous studies suggested that the mGES is associated with physical performance, such as chair stand frequency, open-eyes one-leg stand, walking speed, walking endurance, and physical activity,^{7,11} it was not possible to determine the temporal relationship because of the cross-sectional nature of the study. Notably, no longitudinal study has investigated the relationship between physical function and age-related decline in mGES. Clarifying the baseline functional characteristics of people whose decline is greater than the MCID makes it possible to identify performance-based factors to predict mGES decline. The mGES is a measurement of self-efficacy specializing in gait; thus, mobility and physical activity at baseline may predict future mGES decline.

The purpose of this study was to calculate the age-related MCID for mGES from a 3 years longitudinal study and to identify performance-based factors to predict mGES decline. We hypothesized that mGES would decline over 3 years, and that poor mobility ability and less physical activity at baseline could predict the mGES decline.

Methods

Participants and study design

In total, 87 community-dwelling older adults aged > 60 years residing in local communities in Kyoto and neighboring cities were enrolled in this 3-year longitudinal study (women, n=48, 55.1%; age, 75.1±6.7 years; body mass index [BMI], 21.5±2.6 kg/m²). We disseminated information on this study to community-dwelling older adults who took part in another physical fitness test by a letter. The participants responded with reply letters indicating whether they wanted to participate and then underwent this physical fitness test. The inclusion criteria were living independently and having the ability to walk without an assistive device. The exclusion criteria were mobility limitations due to orthopedic or neurological diseases and cognitive impairment (Mini-Mental State Examination score <20).⁷ Baseline data were collected in 2019 and follow-up data were collected in 2022.

The sample size required to detect the decline in mGES was calculated using G*Power software (version 3.1; Heinrich Heine University, Düsseldorf, Germany). Based on a previous study⁶ that investigated the fall efficacy at baseline and 1 year later, we assumed that at least twice as much change as in a previous study would occur because this was a 3-year longitudinal study. The required sample size was 63 (error=0.05, power=0.80, effect size=0.36).

All participants received an explanation of the study and provided written informed consent prior to their participation. This study was approved by the Ethics Committee of Kyoto University Graduate School of Medicine and complied with the Declaration of Helsinki (R1749).

Baseline measurements

The mGES, fall history, and physical function of the participants were assessed for baseline measurements.

The confidence in walking was assessed using the mGES.^{11,12} The mGES is a 10-item self-report measure that assesses the walking confidence under challenging everyday circumstances as follows: (Q1) walking on a level surface; (Q2) walking on grass; (Q3) stepping over an obstacle; (Q4) stepping down from a curb; (Q5) stepping over a curb; (Q6) ascending stairs with handrails; (Q7) descending stairs with handrails; (Q8) ascending stairs without handrails; (Q9) descending stairs without handrails; and (Q10) walking over a long distance. Each question was scored individually on a 10-point scale, with a maximum total score of 100 points, and a high score indicating

high confidence. The Japanese version of the mGES has demonstrated excellent reliability and validity among Japanese community-dwelling older adults.⁷

The fall histories of the participants were assessed using a questionnaire asking whether they had fallen in the past 12 months.

The following physical function indices were assessed: (1) chair stand frequency, (2) open-eyes one-leg stand, (3) open-close stepping test, (4) walking speed, (5) walking endurance, and (6) physical activity.

(1) The chair stand (sit-to-stand) frequency for 30-s (CS-30) was evaluated as an index of lower limb strength.^{13,14} The participants were asked to sit on a chair and complete as many sit-to-stand trials as possible. The number of repetitions for 30-s was counted, excluding fraudulent trials, such as when the participant's buttocks did not touch the chair or their knees did not extend enough. All measurements were performed once.

(2) The open-eyes one-leg stand time was measured as an index of balance. The participants were instructed to place their hands on their hips and raise any leg according to their preferences. The duration of the one-legged stance was measured up to a maximum of 180-s until the participants deviated from the designated position, such as the standing leg moving, the swing leg touching the standing leg or floor, or the hand moving away from the hip. The measurements were performed twice, with a short break between trials, and the longer time was used for analysis.

(3) The leg agility was assessed using an open-close stepping test.¹⁵ The participants were seated and their feet were placed between two lines (width: 30 cm). To maintain their position, they were allowed to grab a chair with both hands. Subsequently, the participants were asked to open and close their legs as quickly as possible for 20-s. The number of repetitions was counted, excluding improper trials; for example, when the participants could slide their legs or could not open and close their legs at the same time.

(4) The maximum walking speed was recorded. The participants were instructed to walk on a 10 m path with a 3 m approach zone at maximum speed. The measurements were taken twice, with a short break between trials, and the faster time was converted to speed (m/s).

(5) The walking endurance was assessed using the shuttle stamina walk test (SSTw).¹⁶ The participants were instructed to walk as long as possible for 3-min on a 10 m walkway and the total shuttled distance was measured. Before the measurements, the participants practiced the course on a round trip. The evaluator announced a time count every 30-s and at 10-s before the end of the measurements.

(6) The mean number of steps per day was used as an index of physical activity. The participants carried a pedometer with a triaxial accelerometer (ES-500; YAMASA, Tokyo, Japan), except during bathing and sleeping, and recorded the number of daily steps on a self-check sheet. The mean number of steps per day was calculated by dividing the total number of steps for 2 weeks by 14 days and was used for the analysis.

Follow-up measurements

The mGES and Global Rating of Change (GRC) scale were assessed for follow-up. We assessed the mGES in the same manner as the baseline measurement.

To calculate the MCID, subjective changes in the gait function were assessed using the GRC, which was developed as a patient-reported anchor and has been shown to be clinically effective.¹⁷ The participants were asked

how much change they perceived in their gait ability as follows; “Compared to 3 years ago, has your ability to move outdoors (such as walking, climbing stairs) changed?” The responses were recorded on a 5-point Likert scale (much worse (-2), a little worse (-1), no change (0), a little better (1), and much better (2)). In anchor-methods, the “no change group (0)” means that the participants did not feel their changes subjectively, and the “a little worse group (-1)” means that the participants perceived their change.

Statistical Analysis

All statistical analyses were performed using SPSS software version 22 (IBM SPSS, Armonk, NY, USA). Statistical significance was set at $P<0.05$.

First, we confirmed whether mGES decreased over 3 years using the Wilcoxon signed-rank test. Second, we calculated the MCID for the mGES over a period of 3 years. Changes in the mGES were calculated by subtracting the baseline values from those at follow-up. MCID is defined as the smallest difference that participants can perceive as improved or worsened. In this study, we defined the MCID as a difference in the mean change in the mGES value between participants with “no change (0)” compared with those with “a little worse (-1)” according to the responses to the GRC.¹⁸ Spearman’s correlation coefficients were calculated to examine the association between GRC values and changes in the mGES.

Of the 87 participants, 85 participants were included in the analysis because two participants who could not complete all measurements at baseline were excluded. Participants were classified into the decline and keep groups based on whether the changes in mGES during the 3-year period were greater than the MCID (These two groups were defined independently from the anchor-methods). Variance inflation factor (VIF) values were used to confirm multicollinearity. To clarify the performance-based factors at baseline that predict a decline in the mGES, a binary logistic regression analysis (forced entry method) was conducted with the mGES (reference, keep group) as the dependent variable and age, sex, BMI, fall history, and physical function as the independent variables. The adjusted odds ratios (OR) and 95% confidence interval (CI) were calculated.

Results

Calculation of MCID for mGES over 3 years

Over a 3-year period of aging, mGES have decreased significantly (baseline: 83.2 ± 21.4 ; follow-up: 79.3 ± 21.8 , $P=0.022$), and many participants (88.5%) answered “no change (0)” or “a little worse (-1)” about their subjective change of gait ability. The mean changes in the mGES were -1.3 ± 18.1 in the “no change (0)” group and -8.7 ± 16.0 in the “a little worse (-1)” group, respectively (Table 1). The MCID for mGES over 3 years was -7.38 points calculated by anchor-based methods. The Spearman correlation coefficients between the GRC value and changes in mGES was $\rho=0.23$ ($P=0.031$).

Predictors of mGES decline

Based on the changes in the mGES over 3 years, the participants were divided into the decline group ($n=32$; 37.6%, changes in $mGES\geq 8$) and the keep group ($n=53$; 62.3%, changes in $mGES<8$). The baseline characteristics

185 of the participants in each group are shown in Table 2. None of the independent variables exhibited a high degree
186 of correlation ($r=0.9$)¹⁹ and multicollinearity was not observed among the factors ($VIF=1.054-2.430$).^{20,21} As a result
187 of the logistic regression analysis for predicting the mGES decline, low open-close stepping (OR, 0.878; 95%CI,
188 0.782-0.985; $P=0.027$) and SSTw (OR, 0.974; 95%CI, 0.949-1.000; $P=0.049$) were identified (Table 3).

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190 Discussion

191 This is the first study to investigate the degree of age-related decline in the mGES and predict the factors of
192 mGES decline from the baseline assessments. The MCID for mGES over a period of 3 years was -7.38 points and
193 low open-close stepping and SSTw were identified as predictors of mGES decline. These findings suggest that poor
194 agility and walking endurance could predict future mGES decline.

195 Although several studies have emphasized the importance of the MCID,^{9,10,22-25} there are some methods to
196 determine the MCID; however, the best methods are not clear. Therefore, it is necessary to examine whether the
197 MCID calculated in this study is appropriate. The GRC used as an anchor in this study had a positive correlation
198 with changes in the mGES over the 3 years. Additionally, if the MCID was less than a unit standard error of
199 measurement (SEM), it was difficult to identify whether the amount of change was an error of measurement or a
200 clinically significant change.²⁶ Therefore, in such cases, an MCID calculated using anchor-based methods is
201 considered inappropriate. However, the MCID calculated in this study was more than 5.23 points, which was
202 reported as the SEM of the mGES based on the test-retest reliability.²⁷ Moreover, a previous study reported that the
203 mGES in fallers was six points lower than that in non-fallers among patients with end-stage knee OA.¹² Given that
204 patients with knee OA are more likely to fall than the healthy community-dwelling elderly,²⁸ a decline of 7.38 points
205 or more could be considered to be associated with future fall risk in community-dwelling older adults. Therefore, a
206 change of 7.38 points was clinically significant, suggesting that we need to prevent this decline. For these reasons,
207 we considered the MCID calculated in this study using the anchor-based approach to be a clinically significant value.

208 The binary logistic regression analysis showed that the open-close stepping and SSTw were factors of mGES
209 decline. These findings partially support our hypothesis that mobility disability and less physical activity at baseline
210 can predict mGES decline. Makizako et al.⁷ reported that individuals with a fear of falling had reduced gait speed,
211 lower limb function, and walking endurance compared to those without a fear of falling. Thus, a relationship
212 between physical performance and psychological aspects has been proposed. Our longitudinal study also confirmed
213 that poor physical performance, such as agility and walking endurance, could predict psychological changes such
214 as mGES decline. A previous study reported that agility-based training could lead to an improvement in the walking
215 endurance and balance ability,²⁹ and worse walking endurance was associated with a higher falling risk in patients
216 with end-stage knee OA.³⁰ Our findings suggested that indices of agility and walking endurance were not only
217 positively associated with physical performance aspects, but also psychological changes, such as gait efficacy. In
218 addition to these positive relationships, although not statistically significant, gait speed may be negatively associated
219 with mGES (OR, 7.232; 95%CI, 0.950-55.076; $P=0.056$). If applied abilities, such as open-close stepping and
220 walking endurance, are at the same level but only simple walking speed is fast, gait efficacy may worsen because
221 the mGES consists of items focused on walking outside, such as stepping up and down from a curb and walking

long distances. Additionally, contrary to our hypotheses, physical activity was not identified as factors for mGES decline. Watanabe et al.³¹ reported that daily steps in Japanese elderly was 4192±2395 steps/day; however, in our study, the number of daily steps was significantly greater, 7614±3436 steps/day. In other words, it is plausible that the participants in our study may have had higher physical activity than the standard population. This distinctive characteristic may be one of the reasons why physical activity at baseline was not identified as a predictor of mGES decline, and caution should be exercised when generalizing this finding to populations, including frail older adults.

This study had some limitations. First, the validity of the GRC was reported only on 6-month time-span;³² however, we asked about subjective changes over 3 years. Nevertheless, we confirmed a weak correlation ($p=0.23$) between the GRC values and changes in the mGES. Second, the post-hoc power for logistic regression analysis was 0.779, indicating that it is possible that the sample size was slightly inadequate. Finally, follow-up data on physical function and fall history were not collected. Thus, it was not clear whether there was a difference in the physical function or fall history between the decline and keep groups during the follow-up period. However, no studies have investigated the relationship between the physical function and age-related decline in mGES. Our longitudinal study clearly suggested that the physical performance was associated with mGES decline; however, further studies are required to clarify the degree of mGES change in other situations or the discrepancy between physical performance and mGES.

In conclusion, the MCID for mGES over 3 years was -7.38 points and 37.6% of the participants had a decline of more than the MCID over 3 years. Additionally, a decline in mGES was predicted by open–close stepping and SSTw. These findings suggest that a change of 7.38 points in mGES was clinically significant and poor agility and walking endurance can predict future mGES decline.

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Disclosure statement

The authors declare no conflict of interest.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

- Mercieca-Bebber R, King MT, Calvert MJ, Stockler MR, Friedlander M. The importance of patient-reported outcomes in clinical trials and strategies for future optimization. *Patient Relat Outcome Meas* 2018; **9**: 353–367.
- Kamitani T, Yamamoto Y, Fukuma S *et al.* Association between the discrepancy in self-reported and performance-based physical functioning levels and risk of future falls among community-dwelling older adults: The locomotive syndrome and health outcomes in Aizu cohort study (LOHAS). *J Am Med Dir Assoc* 2019; **20**: 195-200.e1.

Bandura A. Self-efficacy: Toward a unifying theory of behavioral Change. *Psychol Rev* 1977; **84**: 191–215.

Tinetti ME, Mendes de Leon CF, Doucette JT, Baker DI. Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. *J Gerontol* 1994; **49**: M140–147.

Myers AM, Powell LE, Maki BE, Holliday PJ, Brawley LR, Sherk W. Psychological indicators of balance confidence: Relationship to actual and perceived abilities. *J Gerontol A Biol Sci Med Sci* 1996; **5**: 37–43.

Delbaere K, Close JCT, Mikolaizak AS, Sachdev PS, Brodaty H, Lord SR. The falls efficacy scale international (FES-I). A comprehensive longitudinal validation study. *Age Ageing* 2010; **39**: 210–216.

Makizako H, Shimada H, Yoshida D *et al*. Reliability and validity of the Japanese version of the modified gait efficacy scale. *Phys Ther (in Japanese)* 2013; **40**: 87–95.

Choi K, Jeon GS, Cho S Il. Prospective study on the impact of fear of falling on functional decline among community dwelling elderly women. *Int J Environ Res Public Health* 2017; **14**: 469.

Revicki D, Hays RD, Cella D, Sloan J. Recommended methods for determining responsiveness and minimally important differences for patient-reported outcomes. *J Clin Epidemiol* 2008; **61**: 102–109.

de Vet HC, Terwee CB, Ostelo RW, Beckerman H, Knol DL, Bouter LM. Minimal changes in health status questionnaires: Distinction between minimally detectable change and minimally important change. *Health Qual Life Outcomes* 2006; **4**: 54.

Okura K, Shibata K, Suda T *et al*. Gait-related self-efficacy is directly associated with daily step counts in individuals with knee osteoarthritis. *Knee* 2022; **39**: 124–131.

Taniguchi M, Sawano S, Maegawa S, Ikezoe T, Ichihashi N. physical activity mediates the relationship between gait function and fall incidence after TKA. *J Knee Surg* 2021; **34**: 1205–1211.

Bohannon RW, Bubela DJ, Magasi SR, Wang YC, Gershon RC. Sit-to-stand test: Performance and determinants across the age-span. *Isokinet Exerc Sci* 2010; **18**: 235–240.

Alcazar J, Losa-Reyna J, Rodriguez-Lopez C *et al*. The sit-to-stand muscle power test: An easy, inexpensive and portable procedure to assess muscle power in older people. *Exp Gerontol* 2018; **112**: 38–43.

Yoshinaka Y, Soga S, Ota N, Yokoyama K, Yamada Y, Kimura M. Light rhythmic exercise with dietary milk fat globule membrane improves physical fitness in an elderly Japanese population: A double-blind randomized placebo-controlled trial. *Biosci Biotechnol Biochem* 2018; **82**: 677–682.

Yamada Y, Itoi A, Yoshida T *et al*. Association of bioelectrical phase angle with aerobic capacity, complex gait ability and total fitness score in older adults. *Exp Gerontol* 2021; **150**: 111350.

Steven J Kamper, Chrisiopker G Maher, Grant Mackay. Global rating of change scales: A review of strengths and weaknesses and considerations for design. *J Man Manip Ther* 2009; **17**: 163–170.

Angst F, Aeschlimann A, Stucki G. Smallest detectable and minimal clinically important differences of rehabilitation intervention with their implications for required sample sizes using WOMAC and SF-36 quality of life measurement instruments in patients with osteoarthritis of the lower extremities. *Arthritis Rheum* 2001; **45**: 384–391.

Miyagishima K, Tsushima E, Ishida K, Sato S. Factors affecting health-related quality of life one year after lumbar spinal fusion. *Phys Ther Res* 2017; **20**: 36–43.

2906 Bayman EO, Dexter F. Multicollinearity in logistic regression models. *Anesth Analg* 2021; **133**: 362–365.
 2917 Varady NH, Pareek A, Eckhardt CM *et al*. Multivariable regression: understanding one of medicine’s most
 2928 fundamental statistical tools. *Knee Surg Sports Traumatol Arthrosc* 2023; **31**: 7–11.
 2929 Çelik D, Çoban Ö, Kılıçoğlu Ö. Minimal clinically important difference of commonly used hip-, knee-, foot-, and
 3000 ankle-specific questionnaires: a systematic review. *J Clin Epidemiol* 2019; **113**: 44–57.
 3011 Copay AG, Subach BR, Glassman SD, Polly DW, Schuler TC. Understanding the minimum clinically important
 302 difference: a review of concepts and methods. *Spine J* 2007; **7**: 541–546.
 3043 Mokkink LB, Terwee CB, Knol DL *et al*. The COSMIN checklist for evaluating the methodological quality of
 304 studies on measurement properties: A clarification of its content. *BMC Med Res Methodol* 2010; **10**: 539–549.
 305 Jaeschke R, Singer J, Guyatt GH. Measurement of health status ascertaining the minimal clinically important
 306 difference. *Control Clin Trials* 1989; **10**: 407–415.
 3067 Hsieh YW, Wang CH, Wu SC, Chen PC, Sheu CF, Hsieh CL. Establishing the minimal clinically important
 308 difference of the barthel index in stroke patients. *Neurorehabil Neural Repair* 2007; **21**: 233–238.
 3079 Newell AM, Vanswearingen JM, Hile E, Brach JS. The modified gait efficacy scale: Establishing the psychometric
 310 properties in older adults. *Phys Ther* 2012; **92**: 318–328.
 3081 Levinger P, Menz HB, Wee E, Feller JA, Bartlett JR, Bergman NR. Physiological risk factors for falls in people
 312 with knee osteoarthritis before and early after knee replacement surgery. *Knee Surg Sports Traumatol Arthrosc* 2011;
 313 **19**: 1082–1089.
 3094 Lichtenstein E, Morat M, Roth R, Donath L, Faude O. Agility-based exercise training compared to traditional
 315 strength and balance training in older adults: A pilot randomized trial. *Peer J* 2020; doi: 10.7717/peerj.8781
 306 Aljehani MS, Crenshaw JR, Rubano JJ, Dellose SM, Zeni JA. Falling risk in patients with end-stage knee
 317 osteoarthritis. *Clin Rheumatol* 2021; **40**: 3–9.
 3118 Watanabe D, Yoshida T, Watanabe Y, Yamada Y, Miyachi M, Kimura M. Dose–response relationships between
 319 objectively measured daily steps and mortality among frail and nonfrail older adults. *Med Sci Sports Exerc* 2023;
 320 **55**: 1044–1053.
 321 Fletcher KE, French CT, Irwin RS, Corapi KM, Norman GR. A prospective global measure, the punum ladder,
 322 provides more valid assessments of quality of life than a retrospective transition measure. *J Clin Epidemiol* 2010;
 323 **63**: 1123–1131.

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Table 1 Changes in mGES over 3 years according to GRC value for the study cohort

GRC		n (%)	Changes in mGES
-2	much worse	5 (5.8)	-6.0±16.0
-1	a little worse	28 (32.2)	-8.7±16.0
0	no change	49 (56.3)	-1.3±18.1
1	a little better	4 (4.6)	0.2±6.4
2	much better	1 (1.1)	0±0

The changes in mGES values were shown as mean ± standard deviation. Abbreviation: mGES, modified Gait Efficacy Scale; GRC, Global Rating of Change Scale.

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Table 2 Characteristics of the participants at the baseline in the decline and keep groups

	All participants N=85	Decline group n=32	Keep group n=53
Age (year)	74.9±6.6	75.7±6.7	74.3±6.7
BMI (kg/m²)	21.4±2.6	21.8±2.7	21.2±2.6
Sex (female,%)	47, 55.2	19, 59.3	28, 52.8
mGES (/100)	83.2±21.4	87.1±17.4	81.0±23.3
CS-30 (times)	26.9±6.2	26.1±6.5	27.5±6.1
Open-eyes one-leg stand (seconds)	66.3±62.3	58.3±60.3	71.2±64.0
Open-close stepping (times)	30.4±5.6	29.0±5.2	31.2±5.9
Walking speed (m/s)	2.16±0.35	2.16±0.28	2.16±0.39
SSTw(m)	276.5±32.2	267.2±33.8	282.2±30.4
Physical activity (steps/day)	7614±3436	7322±3298	7791±3568
Fall incidence (faller,%)	14, 16.4%	10, 31.2%	4, 7.54%

Decline, changes in mGES≥8; Keep, changes in mGES<8. The results are shown as mean ± standard deviation.
Abbreviation: BMI, body mass index; CS-30, chair stand frequency for 30-s; SSTw, shuttle stamina walk test; mGES, modified Gait Efficacy Scale.

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Table3 Logistic regression models for predicting mGES decline from baseline characteristics (N=85)

	odds ratio	95%CI	<i>P</i>
Age (year)	1.024	0.931 - 1.126	0.623
BMI (kg/m ²)	1.179	0.959 - 1.450	0.119
Sex (0=male, 1=female)	2.300	0.650 - 8.141	0.197
CS-30 (times)	1.019	0.909 - 1.1144	0.745
Open-eyes one-leg stand (seconds)	1.001	0.990 - 1.012	0.899
Open-close stepping (times)	0.878	0.782 - 0.985	0.027
Walking speed (m/s)	7.232	0.950 - 55.076	0.056
SSTw (m)	0.974	0.949 - 1.000	0.049
Physical activity (steps/day)	1.000	1.000 - 1.000	0.716
Fall incidence (1=faller, 2=non faller)	1.839	0.438 - 7.727	0.405

Abbreviation: BMI, body mass index; CS-30, chair stand frequency for 30-s; SSTw, shuttle stamina walk test; CI, confidence interval. Bold texts indicate the statistical significance in logistic regression.