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The Relationship between Functional Fitness and Ability to Ride a Bicycle among Community-Dwelling Older Adult in Japan

Ryuichi Hasegawa¹, Fumihiko Goto², Hidehiro Watanabe², Hisanori Ido², Naoki Okayama² and Mohammad Monirul Islam³

¹ Chubu University, JP

² Tokai Memorial Hospital, JP

³ National Institute of Fitness and Sports in Kanoya, JP

Corresponding author: Ryuichi Hasegawa (ryuichi@isc.chubu.ac.jp)

Background: Bicycling is a good mode of transportation for people of all ages. The ability to ride a bicycle requires sufficient physical abilities. This study aimed to examine the relationship between functional fitness and the ability to ride a bicycle for community-dwelling older adults in Japan.

Methods: Forty-eight older adults (13 males, 35 females) were divided into a riding group (those who could ride a bicycle; n = 34) and a control group (those who could not; n = 14). A binomial logistic regression analysis was conducted with the ability to ride a bicycle as the dependent variable and Arm Curl Test, Chair Stand Test, Back Scratch Test, Sit and Reach Test, Functional Reach Test, One Leg-Stand Test, Four Square Step Test, 5 Meter Walk Test, and Timed Up and Go Test as independent variables.

Results: The results of binomial logistic regression analysis showed that, from among various functional fitness test results, only Timed Up and Go scores (odds ratio: 0.29; 95% CI 0.12–0.68) were associated with bicycle riding ability.

Conclusion: These results indicated that Timed Up and Go scores are useful for predicting the ability of older adults to use a bicycle as a means of transportation.

Keywords: Community mobility; Aged; Physical fitness; Bicycling; Postural balance

Introduction

Bicycling offers a relatively cheap and environmentally friendly mode of transportation. Bicycling promotes health and well-being, and is a common means of transportation worldwide (Ekman et al., 2001). Reflecting its benefits, bicycle sharing schemes have become increasingly popular in countries throughout Europe, Asia, and America to encourage cycling as an alternative means of transportation (Rojas-Rueda et al., 2011).

Yakushiji and Takahashi (2013) reported that the average distance from the residence of older adults to the supermarket is 0.32 miles (516 m) in urban areas and 1.49 miles (2,405 m) in suburban areas. However, only 55% of older adults can walk more than 500 m while going for shopping (Iwama et al., 2009). Hino (2002) reported walking (71%) and bicycling (25%) are the primary means of transport for shopping among elderly Japanese living in urban areas. A recent large-scale mail survey indicated that 63% of community-dwelling Japanese older adults in urban areas routinely ride a bicycle in their everyday life (Sakurai et al., 2015). Bicycles, with a front basket in which shoppers can place purchased items, thus offer a useful alternative mode of daily life transportation.

In Japan, the roads and neighborhoods are generally user-friendly, even for older bicycle riders, which means that environment and infrastructure factors present no major barriers to bicycle riding. On the other hand, the functional fitness needed to ride a bicycle has not been well addressed in older bicyclists in Japan

(Rissel et al., 2013) In order to ensure the suitability of bicycle riding as a safe and viable option for older adults, it is important to clarify the elements of physical ability necessary for older adults to ride a bicycle.

The ability to ride a bicycle requires sufficient physical abilities (e.g., muscle strength, balance, flexibility, and sensory perception) and sound cognition, irrespective of the rider's age (Sakurai et al., 2016). Unfortunately, the physical ability to ride a bicycle is not commonly assessed in Japan. Establishing a proper assessment method could help predict the ability of an individual to ride a bicycle and be of value in developing effective screening. Therefore, we hypothesized that functional fitness testing especially of leg strength and balance ability are useful for predicting the ability of older adults to ride a bicycle. Based on this concept, the aim of this study was to examine the relationship between functional fitness and the ability to ride a bicycle in community-dwelling older adults.

Methods

Design

The study described here was a cross-sectional study designed to understand the relationship between functional fitness and bicycle riding in community-dwelling older adults. The basis for the study was the health check-up data collected by Care Prevention Services at the Tokai Memorial Hospital's rehabilitation center.

Participants

In response to a public relations magazine advertisement, 53 older adults from a suburban city in Japan volunteered to participate in this study. The inclusion criteria were: 65 years of age or older, community residence, functional independence, and the ability to undergo physical fitness testing. Participants were excluded if they had been advised by their physician to refrain from functional fitness tests. The status of any current diseases was determined by using self-reported, physician-diagnosed disease information. Two participants were found medically unfit due to uncontrolled hypertension and cardiac arrhythmia. Two others did not complete all measures of the functional fitness testing due to medically related problems (low back pain, $n = 1$; knee pain, $n = 1$). After selection, one volunteer was excluded from the study because he was no longer interested in participating. In all, five volunteers were excluded from the initial list of 53, leaving 48 participants (Figure 1).

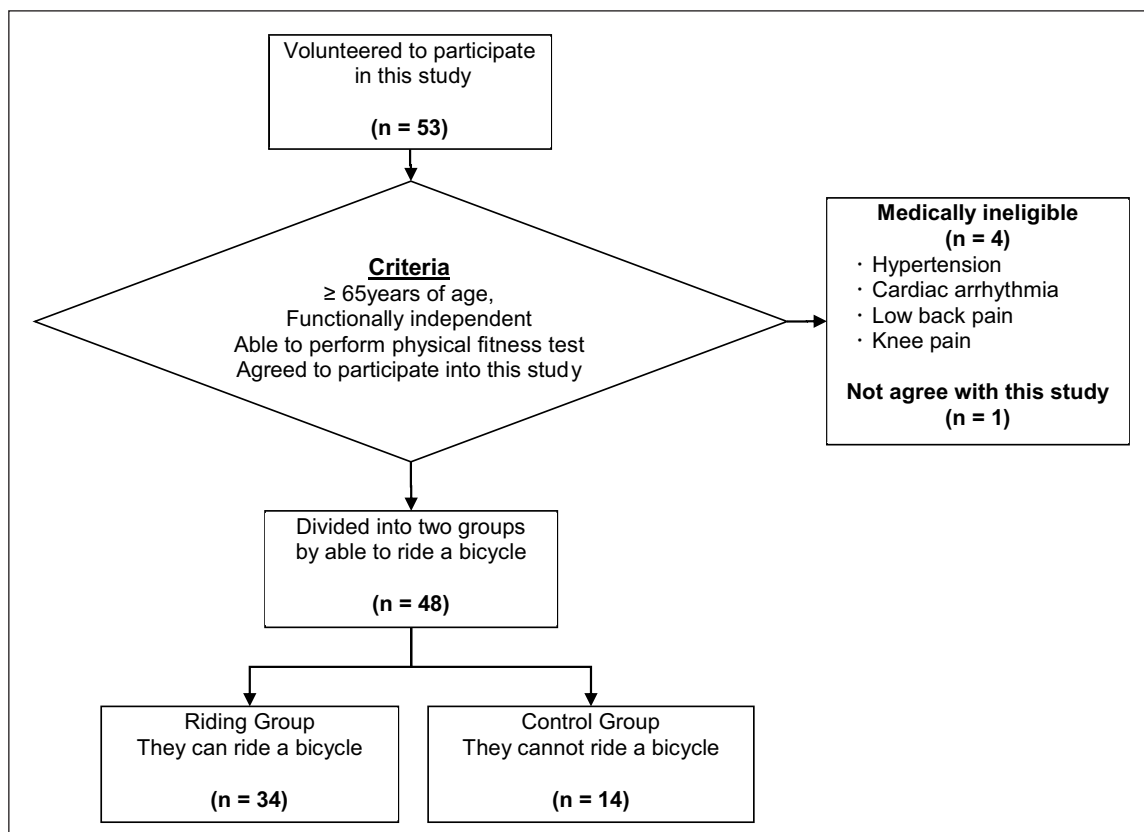


Figure 1: Flowchart tracking the participants.

Procedure

This study protocol, which met the standards of the Declaration of Helsinki, was approved by the research ethics committee of Chubu University (No. 240021-2). Prior to acceptance into the study, a brief health examination was performed by an occupational or physical therapist to check blood pressure and heart rate. The interview included questions regarding medical history and current health status. A clinical history, including information on the subject's regular riding of a bicycle, was collected by questionnaire. Anthropometrics and physical symptoms were collected via questionnaire; functional fitness (muscular performance, flexibility, gait speed and balance) was evaluated on site. Each participant's height and weight were measured and a body mass index (BMI) was calculated. Functional fitness testing was administered in groups. To accommodate group testing, test stations were set up circuit-style. After performing warm-up exercises, participants were evenly divided and sent to their first testing station to begin the tests. The tests were administered at each station by therapists, with the test coordinator overseeing the procedures and rotating the groups. The functional fitness performance of subjects was tested randomly with the aim of minimizing the effect of fatigue.

Individuals were surveyed about their recent ability to ride a bicycle through choosing either "can ride" or "cannot ride" option of a questionnaire. According to the answer provided, the 48 participants (13 males, 35 females; mean age 74.1 ± 4.7 years) were divided into a riding group ($n = 34$) who can ride a bicycle in their everyday life and a control group ($n = 14$) who could not ride at the time of survey.

Study Measure

Measurement variables

A battery of field tests specifically developed for older adults were used to assess the components of functional fitness. These tests require little time or equipment and are designed to be conducted in community settings. Muscular performance was evaluated using the 30-second arm curl test and the 30-second chair stand test. Flexibility was measured using the back scratch test and the sit and reach test. Gait Speed was assessed using the five-meter walk test. Static balance was assessed using the functional reach test and the one-leg stand test. Dynamic balance was assessed using the four square step test and the timed up and go test. The best score of the two test trials of all performance tests was used for analysis.

Measurement of Muscular Performance

As indicated, upper body muscle performance was assessed using the 30-second arm curl test (Rikli & Jones, 1999). On signal, participants were instructed to flex and extend the elbow of their dominant hand, lifting a weight dumbbell (men: 8 lbs. [3.6 kg]; women: 5 lbs. [2.3 kg]) through the complete range of motion, as many times as possible in 30 seconds. A practice trial of one or two repetitions was given, followed by two test trials. The intra-class correlation coefficient (ICC) of test-retest reliability is 0.81. Validity comparisons have been made with a combined one-repetition maximum (1RM) chest press, biceps and upper back, with coefficient of correlation results of 0.78 to 0.81 (Rikli & Jones, 1999).

Lower body muscle performance was assessed using the 30-second chair stand test (Rikli & Jones, 1999). The participant's arms were crossed at the wrists and held against the chest. On signal, participants rose to a standing position from a chair and then returned to a seated position; they continued to complete as many full stands as possible in 30 seconds. A practice trial of one or two repetitions was given, followed by two test trials. The ICC of test-retest reliability is 0.89. Validity comparisons made with a combined 1RM leg press has produced a coefficient of correlation of 0.77 (Rikli & Jones, 1999).

Measurement of flexibility

Upper-body flexibility was assessed using the back scratch test (Rikli & Jones, 1999). Participants placed one hand behind the shoulder and the other hand behind the back. After demonstration by the tester, participants were asked to determine the preferred hand placement and were given a practice trial, followed by two test trials. The score was the number of centimetres between middle fingers that were not touching (minus score) or the number of centimetres by which the middle fingers were overlapping (plus score) The ICC of test-retest reliability for this test is 0.96 (Rikli & Jones, 1999).

Lower-body flexibility was assessed using the chair sit and reach test (Rikli & Jones, 1999). Participants sat on a chair (with a seat that was 42 cm high) and moved forward until they sat near the front edge. Participants were asked to extend their preferred leg with the heel contacting the floor and to bend the other leg so that the sole of the foot was flat on the floor, keeping the extended leg as straight as possible and one hand on top of the other with palms down. Participants were instructed to reach down the extended leg in an

attempt to touch the toes. The score was the number of centimetres short of reaching the toes (minus score) or the distance reached beyond the toes (plus score) while maintaining the prescribed hand position. The ICC of test-retest reliability is 0.95. Validity comparisons made with hamstring flexibility show a coefficient of correlation of 0.83 (Rikli & Jones, 1999).

Measurement of Gait Speed

Comfortable walking speed was measured as the time taken to walk the middle five meters of an 11-meter walk and was timed by a digital stopwatch. The first and last three meters, considered as warm-up and deceleration phases, respectively, were not included in the calculation. Subjects were instructed to walk at a comfortable speed. Each subject performed the task twice. The ICC of test-retest reliability of gait speed has been reported as high (ICC = .90–.96). Validity has been shown via the correlation between measurements of gait speed and measurements obtained for weight-shifting tasks on the Balance Master ($r = -0.49$ to -0.72), the Berg Balance Scale ($r = 0.81$), and the TUG ($r = -0.75$) (Steffen et al., 2002).

Measurement of Static Balance Ability

Static balance ability was assessed using the functional reach test and one leg-stand test. The functional reach test was developed by Duncan et al. (1990). A functional reach scale (graduated in cm) was hung from a wall at a height suitable for the participant. The participant stood in front of the wall with feet together, hands opened and both arms raised in front horizontally and held at the 0 cm level of the scale. On signal, the participant leaned forward, moving the hands forward along the scale as far as possible while keeping the heels in contact with the ground. The ICC of test-retest reliability is 0.81. Validity comparisons made with the center of pressure excursion have produced a 0.71 coefficient of correlation (Duncan et al., 1990).

In the one leg-stand test, each participant was asked to stand on his or her preferred leg. Standing on the leg of choice, the participant raised the other limb so that the raised foot was near, but not touching, the ankle of their stance leg. Each subject was asked to focus on a spot on the wall at eye level in front of him/her for the duration of the eyes-open test. Prior to raising the leg, the subject was advised to rest his/her hands at waist level. Time commenced when the subject raised the foot off the floor. The test was terminated by the tester when either the raised leg of the participant touched the ground or the participant maintained the single legged posture for uninterrupted 60 seconds. The ICC of test-retest reliability for this test is 0.86 (Maribo et al., 2009). Validity has been demonstrated by the relationship of this test to other important variables such as gait performance (Ringsberg et al., 1998), fall status (Briggs et al., 1989) self-sufficiency in instrumental activities of daily living (Drusini et al., 2002).

Measurement of Dynamic Balance Ability

The four square step test (FSST) was developed by Dite and Temple (2002), and incorporates rapid stepping while changing direction. FSST is a dynamic standing balance test designed to assess the ability to rapidly cross over obstacles and change direction in a clinical setting. Four T-canes, set up to look like a crosshair, were used as the obstacles over which participants would step. Participants faced the same direction when stepping to the different squares, and both feet had to touch each square before the next movement. Stepping was completed in the following sequence: forward, right, backward, left, right, forward, left, backward. Timing began when the first foot hit the second square and stopped when the last foot returned to the final square. The ICC of test-retest reliability is 0.98. A cut-off score of 15 seconds serves as the threshold for older adults at risk of multiple falls, with a specificity of 88% and a sensitivity of 85% (Dite & Temple, 2002). Validity comparisons made with the Timed Up and Go test have produced 0.90 as the coefficient of correlation (Whitney et al., 2007).

Functional mobility was assessed using the 8-foot Timed Up and Go Test (Podsiadlo & Richardson, 1991). Participants sat in a chair with their hands on their thighs and feet flat on the floor. On signal, participants stood up from the chair, walked as quickly as possible without running around a cone placed eight feet (2.44 m) ahead of the chair and returned to a fully seated position in the chair. Participants walked through the test one time as a practice and then were given two test trials. The ICC of test-retest reliability is 0.99 (Podsiadlo & Richardson, 1991). Construct validity has been supported through the correlation of TUG scores with measurements obtained for postural sway ($r = -0.48$), step length ($r = -0.74$), Barthel Index ($r = -0.79$), and the Functional Stair Test ($r = 0.59$). For identifying people who fall, the Timed Up and Go Test was found to have a sensitivity of 87% and specificity of 87%. (Shumway-Cook et al., 2000).

Statistical Analysis

Data were analysed using the IBM SPSS Statistics 24 software package (SPSS Inc., Chicago, IL, USA). Values were presented as mean \pm standard deviation (SD) unless otherwise stated. The significance level was set at $p < 0.05$. Comparisons between Riding Group and Control Group were performed using the Mann-Whitney U test or Fisher's exact test as appropriate. Spearman correlation coefficients provided a crude measure of the collinearity among independent variables. As a result, the independent variables could be used simultaneously with other independent variables to examine independent relations. Binomial logistic regression analysis was carried out to assess the prediction capabilities of the tested functional fitness components on bicycle riding in our participants. Binary logistic regression analysis was conducted with ability to ride a bicycle parameter as the dependent variable and various parameters of functional fitness as independent variables. Odds Ratios (OR) with 95% confidence interval (CI) for these factors were computed. The Hosmer and Lemeshow Test was also used to assess model appropriateness.

Results

Participant characteristics and functional fitness scores are presented in **Table 1**. There was significant difference in Height between the two groups. The Arm Curl Test and Chair Stand Test scores were significantly greater in the Riding Group compared to the Control Group ($p < 0.05$). Similarly, the 5-Meter Walk Test, Four Square Step Test and Timed Up and Go Test scores were significantly smaller (indicating better performance) in the Riding Group versus the Control Group ($p < 0.05$).

The correlations presented in **Table 2** demonstrate the rationale for the use of independent variables by showing the lack of association between the independent variables and the other variables. While some variables were significantly correlated, none had strong correlations of concern ($r > 0.8$).

Table 1: Participant characteristics and functional fitness.

Variables	Riding Group	Control Group	p-values
No. of participants	34	14	
Demographic			
Gender (men/women) [†]	10/24	3/11	0.728
Age (years) [‡]	73.1 \pm 3.7	76.6 \pm 6.0	0.053
Anthropometrics			
Height (cm) [‡]	156.7 \pm 8.8	151.5 \pm 8.4	0.041*
Weight (kg) [‡]	56.7 \pm 9.0	55.5 \pm 8.5	0.058
BMI (kg/m ²) [‡]	22.4 \pm 3.5	21.6 \pm 2.5	0.454
Functional Fitness test			
Arm Curl Test (reps/30 sec.) [‡]	26.8 \pm 4.5	21.7 \pm 6.4	0.005*
Chair Stand Test (reps/30 sec.) [‡]	27.0 \pm 5.8	22.6 \pm 6.5	0.043*
Back Scratch Test (cm) [‡]	-6.8 \pm 16.4	-10.5 \pm 13.6	0.271
Sit and Reach Test (cm) [‡]	12.4 \pm 9.0	10.1 \pm 9.8	0.382
5-Meter Walk Test (sec.) ^{‡§}	3.10 \pm 0.41	3.58 \pm 0.68	0.035*
Functional Reach Test (cm) [‡]	30.1 \pm 5.3	26.9 \pm 5.5	0.051
One-Leg Stand Test (sec.) [‡]	43.2 \pm 18.9	31.4 \pm 23.8	0.166
Four Square Step Test (sec.) ^{‡§}	5.95 \pm 1.06	7.26 \pm 2.34	0.046*
Timed Up and Go Test (sec.) ^{‡§}	4.81 \pm 0.73	5.96 \pm 1.28	0.003*

Note:

Values are mean \pm SD.

BMI: Body Mass Index.

*: $p < 0.05$.

[†]: Fisher's exact test was used to evaluate differences between the groups.

[‡]: Mann-Whitney U test was used to evaluate the difference between the groups.

[§]: Improvement of test results in a negative value.

Table 2: Spearman correlation confident (n = 48).

	Arm Curl Test	Chair Stand Test	Back Scratch Test	Sit and Reach Test	5-Meter Walk Test	Functional Reach Test	One-Leg Stand Test	Four Square Step Test	Timed Up and Go Test
Arm Curl Test	1	0.61*	0.55*	0.25	-0.54*	0.52*	0.52*	-0.61*	-0.62*
Chair Stand Test		1	0.48*	0.44*	-0.52*	0.30*	0.47*	-0.71*	-0.73*
Back Scratch Test			1	0.38*	-0.52*	0.34*	0.30*	-0.40*	-0.46*
Sit and Reach Test				1	-0.26	0.08	0.09	-0.47*	-0.28
5-Meter Walk Test					1	-0.36*	-0.16	0.45*	0.63*
Functional Reach Test						1	0.42*	-0.48*	-0.55*
One-Leg Stand Test							1	-0.52*	-0.53*
Four Square Step Test								1	0.75*
Timed Up and Go Test									1

Note:

* $p < 0.05$.

In the binomial logistic regression analysis, Arm Curl Test, Chair Stand Test, Back Scratch Test, Sit and Reach Test, Functional Reach Test, One Leg-Stand Test, Four Square Step Test, 5-Meter Walk Test, and Timed Up and Go Test were entered into the model as independent variables and the ability to ride a bicycle was entered into the model as dependent variable; and the result of that analysis revealed that the Timed Up and Go score (odds ratio: 0.29; 95% CI 0.12–0.68) was the only independent variable that was found to be associated significantly with the ability to ride a bicycle (**Table 3**). The remaining independent variables did not show significant association with bicycle riding ability. The Hosmer and Lemeshow goodness of fit test revealed no significant difference between the observed and expected predictions for riding a bicycle. The percentage of correct predictions using the regression equation was 77.1%.

Discussion

This study examined the relationship between functional fitness and the ability to ride a bicycle for community-dwelling older adults in Japan. A binomial logistic regression analysis showed that, from among various functional fitness test results, only Timed Up and Go test scores were associated significantly with bicycle riding ability.

In the current study, 34 of our 48 community-dwelling older adults (71%) had the ability to ride a bicycle. Sakurai et al. (2015) reported that 63% of older Japanese adults living in urban areas ride bicycles on a regular basis, which is a higher percentage than that of suburban older adults, 48% of whom ride bicycles less than one day per week (Tsunoda et al., 2015). In this research, the volunteers to participate in a study of their ability to ride a bicycle, it is considered that the ratio of bicycle riders who participated in the study would likely be higher than the ratios reported in other research. In addition, the prevalence of bicycling among community-dwelling older adults (≥ 65 years old) in Japan is reported to be much higher than in other countries such as the US (20%) and the UK (8%) (Dill & Voros, 2007; Aldred, Woodcock & Goodman, 2016).

There was significant difference in Height, but no significant difference in demographics (gender and age) or anthropometrics (weight and BMI) between the two groups. Ensuring that the bicycle seat is correctly adjusted and that the bicycle is the appropriate size can be key in safety cycling. The height of saddle to maintain stability and manoeuvrability need they are not rocking at stopping on your feet (Thompson & Rivara, 2001). It was considered that there was a significant difference because the taller could adjust the saddle to the appropriate height.

On the other hand, significantly better performance was noted in muscle functions (Arm curl and Chair Stand), in walking speed (5-Meter Walk Test), and in balance (Four Square Step Test and Timed Up and Go Test) in the riding group as compared to the control group. This result was not surprising, as bicycling requires the muscular function of the lower limbs to support the weight of the rider during stoppage time and provide power for pedaling during acceleration (Ozaki et al., 2015). Moreover, the muscular function of the upper limbs is important for providing muscular forces to grasp the handlebars during braking.

Table 3: Binominal logistic regression analysis.

	B	p	Odds Ratio	95% Confidence Interval
Timed Up and Go Test	-1.25	0.005	0.29	0.12–0.68
Constant	7.50	0.002		

Note:

The Hosmer–Lemeshow test for goodness of fit shows that the chi-square value is 4.58 with $p = 0.71$; overall percentage = 77.1.

Model summary: $-2 \log$ likelihood 45.53; Cox & Snell R square 0.23; Nagelkerke R square 0.33.

Additionally, the 5-Meter Walk Test time and Four Square Step Test time were significantly faster in the riding group. The ability to walk and mobility underlies many basic and community functions necessary for independent living (Studenski, 2009; Moore & Barker, 2017). The results of this study regarding the faster walking speed and dynamic balance ability in the riding group would seem to indicate that people who cycle delay the decline of walking speed and dynamic balance. In general, riding a bicycle by older adults requires a mobility capability that includes muscle function and balance.

There was no significant group difference in flexibility. Bicycling is mainly performed by the movement of the lower limbs. The mean hip range of motion (ROM) during normal bicycling is ranging from 32–70° hip flexion; knee ROM is 66°, ranging from 46–112° knee flexion, and ankle ROM is ranging from 2° plantarflexion to 22° dorsiflexion (Ericson & Németh, 1988). Thus, it could be assumed that a wide ROM at the hip, knee, and ankle joints is not demanding to be able to ride a bicycle even in old age.

There was no significant group difference in static balance. This finding indicated that a static balance ability is not very essential in riding a bicycle. Many studies have found that decreased one-legged standing time is associated with increased risk of falls and declines in the activities of daily living (Michikawa et al., 2009). However, Kim et al. (2015) reported that there was no difference in static balance ability, but there was a difference in dynamic balance ability in older adults who had been riding bicycles compared to those older adults who did not ride a bicycle. Thus, riding a bicycle requires a more sophisticated dynamic balance ability, which would explain why no significant difference was found between the two groups.

Correlation coefficients (Spearman's rho) were calculated to examine multicollinearity between potential predictors (**Table 2**). The simplest approach to identify multicollinearity is through a correlation matrix. While some variables were significantly correlated, none had strong correlations of concern ($r > 0.8$). Thus, the independent variables could be used simultaneously to examine various independent relations. Binomial logistic regression analysis showed that Timed Up and Go score was the only significant variable predicting the riding of a bicycle. The Timed Up and Go test is well known and widely used to produce an accurate, objective assessment of agility (Rikli & Jones, 1999; Bohannon, 2006). Timed Up and Go tests multiple components of balance and mobility. The test includes a sequence of functional activities, including sit-to-stand, a 2.44-meter walk, a 180° turn, a walk back, another 180° turn and finally return to the original sitting position. The sit-to-stand component is itself a sequence of multiple elements. This “simple” motor task requires forward movement of the center-of-gravity while still seated (in preparation for standing), acceleration of the center-of-gravity both in the anterior-posterior and vertical plane, push-off, and stabilization once standing is achieved (Janssen, Bussmann & Stam, 2002). In addition, Timed Up and Go also demands appropriate initiation of stepping, acceleration and deceleration, and preparation to turn twice. Thus, success in the Timed Up and Go test requires a dynamic balance capability that includes various continuous motions. On the other hand, Bicycling requires the ability to adequately control balance, posture, and pedalling. Study results indicating that Timed UP and Go scores were the only significant variable predicting the riding of a bicycle suggest that this test provides valuable information regarding an older person's ability to ride a bicycle.

The incidence of mental decline usually correlates with increased age. Older adults with cognitive decline prove difficult for the older adults to simultaneously maintain balance, exert force, and display swift decision-making while bicycling (Ikpeze et al., 2018). Although the current study did not measure cognitive function directly, recent studies, as noted, suggest that adequate cognition, particularly the executive function (i.e., the inhibitory function and the ability to multitask), is necessary to perform the Timed Up and Go test (Mirelman et al., 2014). On the other hand, the Timed Up and Go test assesses multi-limb motor control ability, including lower-extremity muscular performance and balance (Mun-San Kwan et al., 2011), indicating

that the detected association between Timed Up and Go test scores and bicycle riding in the current study could be a valuable evidence for testing fitness to ride a bicycle in old age. Timed Up and Go scores are a strong predictor of the ability to ride a bicycle. These results produced in this study should be useful for predicting the ability to ride a bicycle, for setting of rehabilitation goals by therapists, and planning a program of community-based exercise by activity directors or exercise leaders.

Limitations

The present study has several limitations. The main limitation was the small sample size for each group. Findings from 48 participants, albeit informative with regard to assessed functional fitness, have a restricted range of implications. Therefore, a large cohort study needs to be conducted to ascertain the factors associated with riding a bicycle in community-dwelling older adults.

Second limitation was that we have assessed the bicycle riding ability through self-reported questionnaire survey only and we did not check their practical ability to ride a bicycle as well as whether they were using their bicycles as a mode of their daily life transportation ability to ride a bike. Actually, the use of bike as daily transportation was not assessed in a riding group.

A third potential limitation was the use of a cross-sectional design, which precluded a determination of the causality between functional fitness and bicycle riding ability. For this reason, our study design cannot provide proofs about cause-and-effect relationships. Finally, since the study was conducted in a local city in Japan, generalization of study findings to more urban or rural areas is uncertain; this should be confirmed in future studies.

Conclusion

We found that 71% of our study's participants were able to ride a bicycle. Results suggest that, for community-dwelling older adults, riding a bicycle was associated with better performance on the Timed Up and Go test (versus other variables indicating physical ability). This would seem to suggest that riding a bicycle could help older adults maintain their agility and dynamic balance. This finding might help determine the risk to an individual of riding a bicycle. It might also be used to support and promote the use of the bicycle as an important practical means of daily life transportation for community-dwelling older adults. Finally, the information produced in this study should be useful for predicting the ability to ride a bicycle, for setting goals, and for planning a program.

Abbreviations

BMI = Body mass index

1RM = one-repetition maximum

FSST = Four square step test

SD = Standard deviation

OR = Odds Ratios

CI = 95% confidence interval

ROM = Range of motion

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Competing Interests

The authors have no competing interests to declare.

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