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Structural Equation Modeling of the Relationships between Lifestyles and Related Health Factors of the Community-Dwelling Elderly

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Abstract. [Purpose] This study investigated the relationships among lifestyles, functional capacity and motor ability using structural equation modeling (SEM). [Subjects] The participants were 211 elderly persons (average age: 76.4 ± 8.6 years) living in K Prefecture. [Methods] The survey was conducted by interviews and motor ability test. There were 22 items for lifestyles, 13 items for functional capacity and 3 items for physical performance in the survey. In the SEM analysis, we employed a multiple basic model. [Results] The root mean square error of approximation (RMSEA) of the final model was 0.09 and the Akaike information criterion (AIC) was 59.4 in the peripheral models. The degree of association between lifestyles and motor ability, and functional capacity was 0.99. [Conclusion] This study defined a pilot model for factors influencing lifestyles. Although it remains necessary to conducts further analyses with more valid measurements and constructs.
Key words: Lifestyles, Elderly, SEM

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INTRODUCTION

In order to intervention in health promotion in the aging society, the health of elderly has defined that independence euphoria and mental health awareness activities to ensure independent living skills and as a lifestyles that seems to help the body maintain and improve health in this way (for health promotion activities), psychological (actions which bring peace of mind), social (activities related to social participation) that it is important to continue to study a wide range taken from the side[1)]. Haga[2)] said that not unnatural concrete aim of the measures as indicators, successful aging is the policy goals of Healthy Japan 21. The previous studies has considered of health and lifestyle[3,4)]. It was represented by questioning the health habits[5)].

In the present study, we aimed to demonstrate the relationships among modifiable lifestyle factors, functional capacity factors and motor ability factors through structural equation modeling (SEM).

SUBJECTS AND METHODS

The participants were 211 elderly persons who received a medical examination at health centers, in K Prefecture in 2008. All participants signed informed consent forms. Table 1 shows the breakdown of the participants by sex and age.

The reliability and validity of the lifestyle scale has already been confirmed as a questionnaire method. The lifestyle scale evaluates activities of daily living (ADL)[6)]. Functional capacity consisted of the following 13 items used in the Index of Competence[7)]. We used scores of 1 and 0 for right and wrong responses to option for each question and summed the total scores. A perfect score was 13 points.

We measured hand grip strength, knee extension strength[8)], and 10 m walking time as motor ability items. We evaluated hand grip strength of the dominant hand with a mechanical dynamometer. For the knee extension strength test, we asked participants to sit on a chair and to extend the leg as far as possible while keeping the knee flexed at 90°. For the 10 m walking time, we asked participants to walk on a straight walkway 16 m in length on a flat floor once at their maximum velocity. Walking time was measured over the 10 m distance between marks 3 and 13 m from the start of the walkway.

In the SEM analysis, we employed a multiple basic model in which the observed variables were used as indices for each of the structural variables, and the relationships among the structural variables were studied. Statistical analyses were performed using AMOS18.

Table 1. Distribution of participants in each age group

Age group	Male	Female	Total (%)
60–75 (years)	29	54	83 (39)
75–90 (years)	36	92	128 (61)

Table 2. Mean values and standard deviations for each observed variable

Variable		Mean ± SD	N
Biologic factors	Age (years)	76.4 ± 8.6	211
	Height (cm)	150.3 ± 9.0	211
	Weight (kg)	54.0 ± 8.0	211
	BMI (kg/m^2)	24.6 ± 9.4	211
Motor ability factors	Grip strength (kg)	17.5 ± 9.2	211
	Knee extension strength (kg)	13.9 ± 5.4	211
	Maximum walking velocity (m/sec)	1.35 ± 0.49	211
functional capacity	13 Items (score)	9.1 ± 4.6	211
Lifestyles	22 Items (score)	13.1 ± 6.8	211

SD: Standard deviation.

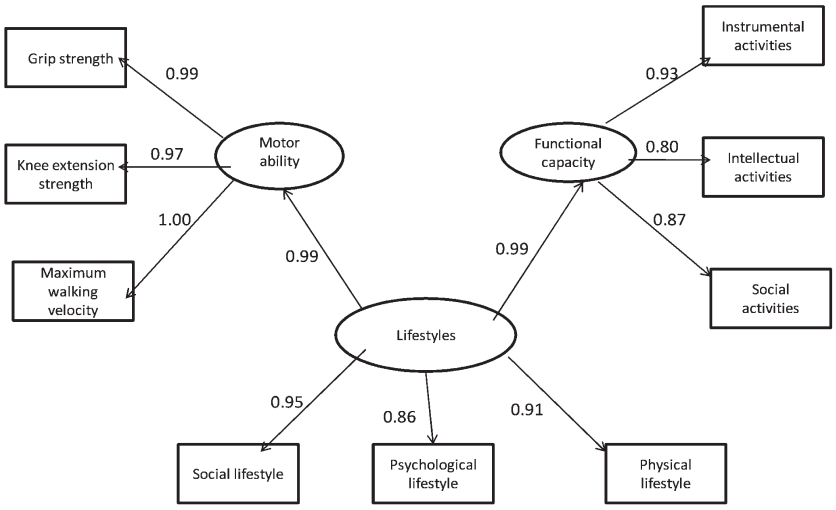

Fig. 1. Path diagram from the final model, showing intake factors. Circles represent latent variables. Boxes represent observed variables. Straight arrows represent effects. RMSEA=0.09, AIC=59.4.

RESULTS

Table 2 shows the numbers of participants, mean values, and standard deviations of the observed variables. The mean ± SD of the functional capacity and lifestyle scale were 9.1 ± 4.6 and 13.1 ± 6.8, respectively.

Figure 1 shows a path diagram of the final model. The causal correlation coefficient for each variable is indicated above the arrow. In the final model, lifestyles were of physical, psychological, and social lifestyle factors. The factors of direct associations were 0.99 between lifestyle and functional capacity, and motor ability.

DISCUSSION

This study modeled the relationships between of lifestyles, functional capacity, and motor ability and clarified the quantity and the strength of factors influencing between them. Latent variable see the exponential impact on each observed variable were from 0.80 to 1.00. It is suggested that lifestyle was considered any validity measure.

According to elderly competence, there are the seven stage models. Koyano[7] said competence, model of the self-reliance is the index of instrumental, intellectual activity and social role, and activity ability at the mean self- reliance level is the least necessary for the elderly to have ADL equipping them for society.

One limitation of this study was in its inability to clarify the efficacy of prevention because it was a cross-sectional model. To address this limitation, further longitudinal studies will be necessary.

In conclusion, this study defined a model for the study of factors influencing lifestyles. We consider that lifestyles are related to the maintenance of self-reliance with aging.

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