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## ORIGINAL ARTICLE

### Development of a Comfort Scale for Community Old Dwellers with Mild Cognitive Decline

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#### ABSTRACT

This study aimed to develop a scale for assessing the comfort in the daily life of community dwellers with mild cognitive impairment (MCI) or mild dementia (MD), the Comfort Scale for Mild Dementia (COSMID). A questionnaire survey was conducted for community dwellers with MCI or MD. A principal component analysis was performed using the responses to the items of a trial version of COSMID and other items of conceptually relevant established scales to confirm the dimensional allocation and the independence/similarities of these components. Then, we examined the reliability and validity of the entire COSMID item candidates. Of the six components extracted, the COSMID items were allocated to two components, “Comfortable living (PC1)” and “Fulfillment of physiological needs (PC4).” These components were positively correlated with other components reflecting relevant concepts. Both Cronbach’s  $\alpha$  and McDonald’s  $\omega$  of these components were at an acceptable level ( $>0.70$ ). Finally, the COSMID comprising 15 items was completed, and its component reliability coefficients were  $\alpha = .880$  and  $\omega = .873$ . PC1 was a principal component of COSMID. Furthermore, PC4 was composed of five components of COSMID, thereby demonstrating its independence as a component of COSMID. PC1 and PC4 were the principal components with independence and similarities in the measured content on the factor space. The COSMID showed high internal consistency, and it was suggested to be an effective tool for objectively assessing comfort in daily life for people with MD.

*Keywords:* Comfort in daily living, Construct validity, Dementia assessment scale, Mild dementia, Principal component analysis

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## 1. Introduction

As the world population continues to age, initiatives are being taken worldwide to respond to the universal challenges of accommodating the increasing number of people with dementia<sup>1)</sup>. Globally, there are 50 million people diagnosed with dementia. Furthermore, it is reported that approximately 10 million people are newly diagnosed with dementia every year<sup>2)</sup>. In Japan, the country with the longest life expectancy, it is predicted that one in five elderly people will have dementia by 2025<sup>3)</sup>.

In Japan, the Comprehensive Strategy to Accelerate Dementia Measures (New Orange Plan) was decided in 2015<sup>4)</sup>. This plan aims to realize a Community-based Integrated Care System that provides medical care, nursing care, prevention, housing, and life support comprehensively so that people with dementia or patients requiring severe nursing care can continue to live comfortably in familiar surroundings<sup>5)</sup>. The policy particularly emphasizes the perspectives and needs of individuals with early-stage dementia. Additionally, it is intended to establish a system for early diagnosis and treatment of mild cognitive impairment (MCI) through cooperation among various occupations in the living sphere.

MCI is a stage between normal age-related cognitive changes and very early dementia (ED). The differences among the symptoms of MCI, normal aging, and severe ED are very subtle and difficult to distinguish<sup>6)</sup>. There are many similarities between the diagnosis and recognition of MCI and mild dementia (MD). People with MCI have an objective evidence of decline in cognitive function, but they are able to function independently in their daily life in a way that is indistinguishable from the past. Conversely, MD has evidence of significant difficulties in daily life that prevents independence<sup>7)</sup>. People with MCI can generally understand their memory functions and conditions; however, they are more likely to experience fear and anxiety about transitioning to dementia<sup>8)</sup>, loss of self-confidence, and loss of motivation to live independently<sup>9)</sup>. Instrumental activities of daily living such as cooking, medication management, and money management begin to affect their daily life<sup>10)</sup>. Many people with early-stage dementia live at home with anxiety because receiving services under the Long-Term Care System in Japan is difficult<sup>11)</sup>. According to Fujita et al., the wishes in the lives of people with MCI are independence, autonomy, and continuation of self-sufficient hobby activities. On the contrary, the wishes of people with ED are to continue living their lives as usual; they need support that their wishes can be realized and to lead a comfortable life<sup>12)</sup>. Hence, to support them, it is necessary to develop evaluation tools for professionals to comprehend whether individuals are experiencing comfortable daily life.

Iwase et al<sup>13)</sup>. developed the scale of “Anshin” (it means comfort in Japanese). This scale is aimed at measuring the level of comfort situation in Japanese working adults and university students. A peculiar characteristic of this scale is that it reflects cultural factors: i.e., peace of mind of Japanese people, which can be acquired by interacting with others and having a sense of belonging to society, based on one’s own experiences<sup>13)</sup>. However, this definition cannot be applied to people with dementia, since it is difficult for people with dementia to gain comfort by themselves, and it is necessary to consider the surrounding people and the environment. Another scale measuring the comfort of demented person had been developed in the US<sup>14)</sup>, but it was designed to evaluate comfort in the specific situation of end-of-life. Also, two quality of life (QOL) scales that involved a comfort measure had been established, i.e., dementia QOL instrument<sup>15)</sup> and Japanese QOL instrument for older adults experiencing dementia (QLDJ)<sup>16)</sup>. However, these scales are most suitable to people with moderate to severe dementia who have difficulty living of their own accord. Thus, for patients who suffered from MCI during the earlier stage through the subsequent stages, no scale exists to measure their comfort in the daily life. Under the integrated community care system, the Japanese government is working to create a system in which even if people suffer from a disease or dementia, they can continue to live their own way and comfortable in their familiar communities with

the mutual help and formal service. However, the support strategy has not been established. We believe that developing a comfort scale for MD will be possible to measure the comfort, and specialists and local residents will be able to find support strategies by utilizing it, contributing to the realization of a comfortable daily life for community dwellers with MD.

To date, the voice of the people with dementia was considered important in providing appropriate care. However, there are only a few scales in which people with dementia were research participants without proxies, and interviews were used for data collection<sup>15,17</sup>). Therefore, we aimed to develop an objective scale of comfort in daily life by conducting a questionnaire survey for people with MCI and MD and to test the validity of the scale in this study. We believe it will be possible to find support strategies by applying this scale in the home care field.

## **2. Methods**

### **2.1. Development of the Comfort Scale for Mild dementia (COSMID)**

Thirty-nine item pools were generated from the results of a prior concept analysis<sup>18</sup>). The 39 item candidates were created from a literature search of MD and our concept analysis<sup>18</sup>). We then requested four experts specialized in dementia nursing to determine whether these items are easy for people with MD to understand and if they accurately express comfort situation in their daily lives. After confirming the content validity, we constructed an initial version of 21-item comfort scale. Each of these items are measured on a 3-point Likert scale, with the following numeric rating scale: “I am worried” (0), “Neither” (1), and “I am not worried” (2). A cumulative score ranges from 0 to 42, with higher scores indicating stronger levels of comfort. Using the initial version, a pretest was conducted on 10 people with MD living in a community. After examining the face validity of the results, the wording of the questions was revised and designated as COSMID.

### **2.2. Data collection**

#### **2.2.1. Participants**

The target participants for the COSMID were those who were diagnosed with MCI or MD at the Medical Center for Dementia-related Diseases, and a doctor judged whether they were able to answer the questionnaire survey. We requested the participation of 97 medical centers for dementia in western part of Japan. The questionnaire was distributed to 234 participants from 25 medical centers for dementia who were expected to be selectable of which 73 returned completed questionnaires (recovery rate 31.2%).

#### **2.2.2. Survey**

We conducted an anonymous self-administered questionnaire survey in 2021. We sent the letter of request for participation in the research, questionnaires, and return envelopes to the participants via the counselors of the medical centers. The participants were asked to take the survey within two weeks and to send it back in the return envelope.

The questionnaire consisted of three parts of items: i.e., demographics, COSMID, and scales for checking the factorial independency of COSMID. Demographic items were age, sex, family structure, disease name, long-term care certification, and usage of long-term insurance-covered care services. Then, QLDJ1<sup>6</sup>) items and items created using the ODAYAKA serenity scale (ODY)<sup>19</sup>) as a reference were used to examine the measurement dimension of the COSMID. We used two scales to evaluate the condition of elderly people with dementia from multiple domains, such as physical, psychological, and social aspects, same as COSMID. Yamamoto et al., who developed QLDJ, defined a state of high QOL as living a

happy and comfortable daily life (Yamamoto et al., 2000). QLDJ comprises 24 items in 3 domains. It was shown that the reliability coefficients for each have high internal consistency: “Interacting with surroundings” (eight items,.89), “Expressing self” (ten items,.88), and “Experiencing minimum negative behaviors” (six items,.80). Higher scores on “Interacting with surroundings” and “Expressing self,” and lower scores on “Experiencing minimum negative behaviors,” indicate higher QOL. ODY is a scale that is expected to evaluate mental stability and make it easier to understand comfort. It comprises 25 items in 4 domains, which include “Interaction with others” (nine items,.92), “Exercising one’s true self” (seven items,.90), “Satisfaction and vigor” (six items,.86), and “Enjoyment of activities” (three items,.89). Higher scores indicate increased feeling of calmness. We created eight items using each domain of ODY as a reference.

### 2.3. Analysis

We examined the relationships between the components of comfort in daily living identified in the concept analysis and the known components such as QOL on factor space and further probed the independence/similarity. SPSS Statistics Ver. 28 was used for the statistical analysis. The respondents were requested to answer questions of the COSMID, and those created with reference to QLDJ have established reliability, validity, and ODY<sup>19)</sup>. A principal component analysis was performed on the total 53 items to find the multi-component structure. The following set of rules helped to determine the optimal number of components to be retained<sup>20)</sup>: Kaiser’s criterion for components with eigenvalues  $>1.0$ , the ratio of the eigenvalue of the first and second unrotated component  $\geq 4.0$ <sup>21)</sup>, Cattell Scree Test, and individual item loadings  $\geq 0.40$ . Then, a promax rotation was used to simplify the components. The promax rotation in principle component analysis has been conducted since the 1980s and has continued to be used in several psychometric and personality studies<sup>22)</sup>. These rules were followed by examining the pattern and component correlation matrices to evaluate the independence of the dimensions of the names of the principal components and the created scale. Cronbach’s  $\alpha$ <sup>23)</sup> and McDonald’s  $\omega$ <sup>24)</sup> were calculated to determine the reliability of each scale based on the principal component structure. Then, we conducted a reliability analysis of the item candidates for COSMID.

### 2.4. Ethical approval

The participants were explained about the significance, purpose, method, and ethical considerations of the research, such as the protection of personal information or free will for research cooperation, using the request document before participation and were asked to inscribe a circle in the checkbox located on the cover page of the survey form to indicate their consent. Furthermore, participants were asked to seek support from the staff of the medical care center or a family member if they felt difficulty in answering a question. This study was approved by the Ethics Committee of the Graduate School of Nursing, Okayama University Graduate School of Health Sciences (Approval no. D20-07).

## 3. Results

### 3.1. Demographic character of respondents

Table 1 presents the questionnaires distributed to 234 people with MD, including those with MCI, who visited the medical centers for dementia, and 73 (31.2%) returned completed questionnaires. Of these, 72 were analyzed, excluding one invalid response.

The participants comprised 27 men (37.5%) and 45 women (62.5%) with a mean age of  $76.1 \pm 8.7$  (mean  $\pm$  SD) years.

Thirty-eight (52.8%) had never applied for certification of eligibility for long-term care, one required extensive long-term care, thirty-two (44.5%) required light long-term care, and twenty-four (33.3%) did not have any underlying disease. Fifty-two (72.2%) lived with other family members, forty-two (58.3%) did not use long-term care insurance services, and thirty (41.7%) used them.

### 3.2. Dimensional structure of the item candidates for COSMID

A principal component analysis of the responses to the COSMID and of the existing scale items extracted six principal components. Table 2-1,2 shows the factor pattern after a promax rotation of the six principal components with an eigenvalue of  $\geq 1.0$ .

Regarding the characteristics and naming of each principal component, the first principal component (PC1) was composed of 11 items of COSMID, including “7. A relaxing living environment” and “13. Satisfaction with daily living” and one item of QLDJ. As they described an emotional state representing comfort and the presence of a lifestyle and people who help create that, it was named “Comfortable living.” The third principal component (PC3) comprised three items of the COSMID, namely, “15. Enjoyment of social interactions,” four items of the QLDJ, and one item of the ODY, and was named “Interaction with others” to describe relationships with people and the presence of things that interest them. The fourth principal component (PC4) comprised exclusively of the five items of the COSMID related to physiological needs, such as “1. Does not worry about meals” and “3. Does not worry about defecation,” and it was named “Fulfillment of physiological needs.” The second principal component (PC2) mainly included items of the QLDJ and one of the items of COSMID. As it showed how the presence of others helps modulate an upset emotional state and attain stability, it was named “Presence of others.” The fifth principal component (PC5) consisted mainly of the ODY scale items, and the sixth principal component (PC6) consisted only of four items of QOL and were accordingly named “Proactive action” and “Emotional stability,” respectively. Factor loading of the single COSMID item “8. Doing whatever I can do by myself” was low and did not have any commonalities with the other items. Additionally, the reliability coefficients of the principal components that indicate the characteristics of this scale were PC1 ( $\alpha = .898$ ,  $\omega = .905$ ), PC4 ( $\alpha = .786$ ,  $\omega = .770$ ), and PC3 that indicates the similarity with other scales ( $\alpha = .600$ ,  $\omega = .637$ ).

As for inter-component correlations, PC1 “Comfortable living” was positively correlated with all other principal components. Among these, there was some correlation with PC2 “Presence of others” ( $>0.40$ ) and was almost orthogonal to PC6 “Emotional stability” (0.01). PC3 “Interaction with others” showed a weak positive correlation with all principal components ( $<0.30$ ). PC4 “Fulfillment of physiological needs” was positively correlated with PC1, PC2, and PC5 “Proactive action” and was almost orthogonal to PC6 ( $-0.05$ ). Thus, the three components of the COSMID PC1, PC3, and PC4 had some communality on the factor space with the components of the other scales. Furthermore, PC2 “Presence of others” was positively correlated with PC1 and PC5 ( $>0.35$ ), had a weak positive correlation with PC4 ( $>0.20$ ), and was almost orthogonal to PC6 ( $-0.06$ ). PC5 “Proactive action” showed a weak negative correlation with PC6 ( $-1.3$ ) and a positive correlation with the other principal components, including a weak correlation with PC3 ( $>0.10$ ). PC6 “Emotional stability” was almost orthogonal to PC1, PC2, and PC4, and showed a weak positive correlation with PC3 ( $>0.25$ ).

Table 1. Demographic character of respondents

N = 72

		N	(%)
<b>Basic characteristics of the participants</b>			
Age (M ± SD)		76.1 ± 8.7	
Sex	Men	27	(37.5)
	Women	45	(62.5)
Long-term care certification	Never applied	38	(52.8)
	Requiring help 1	7	(9.7)
	Requiring help 2	4	(5.6)
	Long-term care level 1	20	(27.8)
	Long-term care level 2	1	(1.4)
	Long-term care level 3	0	(0.0)
	Long-term care level 4	0	(0.0)
	Long-term care level 5	1	(1.4)
Disease name	Hypertension	22	(30.6)
	Sequelae of brain stroke	2	(2.8)
	Cardiac disease	7	(9.7)
	Diabetes	7	(9.7)
	Nothing in particular	24	(33.3)
	Other	15	(20.8)
<b>Family composition</b>			
Household structure	Living alone	20	(27.8)
	Living with family	52	(72.2)
Relationship	Spouse	39	(54.2)
	Child	21	(29.2)
	Spouse of child	4	(5.6)
	Grandchild	4	(5.6)
	Parent	2	(2.8)
	Parent of spouse	0	(0.0)
	Other family	2	(2.8)
	Other	1	(1.4)
<b>Service use status</b>			
Service use	No	42	(58.3)
	Yes	30	(41.7)
Service name	Visiting long-term care	6	(8.3)
	Visiting nurse	3	(4.2)
	Visiting rehabilitation	2	(2.8)
	Day service	21	(29.2)
	Day care	7	(9.7)
	Other	1	(1.4)

*Note.* Service names are abbreviated.

Table 2-1. Dimensional structure of the item candidates for CSMID

		PC1	PC2	PC3	PC4	PC5	PC6	Existing scale <sup>†</sup>
PC1: Comfortable living ( $\alpha = .898, \omega = .905$ )								
COSMID 20	Feeling of being cherished	<b>0.95</b>	-.35	0.23	0.02	-.27	-.17	
COSMID 13	Satisfaction with daily living	<b>0.86</b>	0.08	-.11	0.05	-.05	0.01	
COSMID 9	Someone understands how I want to live	<b>0.83</b>	0.07	0.18	-.23	-.13	0.12	
COSMID 7	A relaxing living environment	<b>0.82</b>	-.16	-.08	0.06	0.18	-.16	
COSMID 10	Feeling calm	<b>0.74</b>	-.07	0.07	0.19	0.07	-.27	
COSMID 18	Someone listens to me when I am worried	<b>0.69</b>	0.37	-.16	0.06	-.50	0.24	
COSMID 21	Feeling of happiness	<b>0.68</b>	0.14	0.01	-.12	0.11	-.08	
COSMID 12	Living faithfully to my uniqueness	<b>0.65</b>	0.26	-.07	-.17	0.15	-.16	
COSMID 19	People who understand me holistically	<b>0.65</b>	-.22	0.36	0.06	-.08	0.03	
COSMID 11	Living at my own pace	<b>0.64</b>	0.02	-.29	0.13	0.17	0.35	
COSMID 6	Does not worry about money	<b>0.56</b>	-.59	-.04	0.35	0.13	0.13	
QLDJ 4	Appears to be content...	<b>0.5</b>	0.16	0.11	-.10	0.3	-.06	Interacting with surroundings
PC2: Presence of others								
QLDJ 13	Takes care of one's...	-.21	<b>0.79</b>	0.18	0.08	-.03	0.06	Expressing self
QLDJ 7	Seek contact with ...	-.09	<b>0.73</b>	0.29	0.03	-.04	0.05	Interacting with surroundings
QLDJ 17	Dose not express beliefs...	-.08	<b>0.68</b>	0.21	0.03	-.34	0.22	Expressing self
QLDJ 11	Is considerate to...	-.04	<b>0.59</b>	0.03	-.06	0.12	0.13	Expressing self
ODY 4	Relaxed	-.03	<b>0.56</b>	0.06	-.06	0.45	0.13	Satisfaction and vitality
ODY 6	Calm and acceptance	0.05	<b>0.47</b>	0.23	0.2	0.09	-.09	Interacting with surroundings
COSMID 17	Someone who understands my health status	-.01	<b>0.43</b>	0.28	-.18	-.08	0.33	
ODY 8	Kind to others	-.22	<b>0.41</b>	0.29	0.24	0.31	-.12	Interacting with surroundings
QLDJ 22	Makes repeated efforts to...	-.33	<b>-.60</b>	0.02	0.1	0.1	0.29	Experiencing minimum negative behaviors
QLDJ 21	Restless and wound up...	-.10	<b>-.66</b>	0.23	0.01	-.14	0.39	Experiencing minimum negative behaviors
QLDJ 23	Throws, hits, kicks or...	-.10	<b>-.66</b>	0.23	0.01	-.14	0.39	Experiencing minimum negative behaviors
QLDJ 24	Calls out, yells...	-.15	<b>-.68</b>	0.3	-.04	-.08	0.31	Experiencing minimum negative behaviors
QLDJ 20	Resists...	-.04	<b>-.73</b>	0.24	-.26	0.1	0.21	Experiencing minimum negative behaviors
PC3: Interaction with others ( $\alpha = .600, \omega = .637$ )								
COSMID 15	Enjoyment of social interactions	-.20	0.07	<b>0.77</b>	0.14	-.08	0.05	
QLDJ 3	Shows pleasure or enjoyment...	0.05	0.11	<b>0.67</b>	-.10	0.08	0.05	Interacting with surroundings
QLDJ 1	Smile or laughs...	-.04	0.32	<b>0.65</b>	0.2	0	-.17	Interacting with surroundings
COSMID 16	Desires to be helpful to others	0.33	-.17	<b>0.63</b>	-.13	-.14	-.23	
QLDJ 12	Has something to be...	-.04	-.06	<b>0.58</b>	-.17	0.06	-.16	Expressing self
COSMID 14	Relationship with close ones (including pets)	0.05	0.05	<b>0.52</b>	-.03	-.02	-.11	
QLDJ 15	Shows interest in events...	0.02	-.16	<b>0.51</b>	0.29	0.27	-.43	Expressing self
ODY 7	Spends time with others one gets along with	0.3	0.24	<b>0.47</b>	0.03	0.17	0.01	Interacting with surroundings

Note. Principal component analysis was applied using Promax rotation.

Kaiser's criterion for components with eigenvalues >1.

<sup>†</sup>Abbreviations: QLDJ: Japanese Quality of Life Instrument for Older Adults Experiencing Dementia (Yamamoto-Mitani et al., 2002), ODY: ODAYAKA scale

(Tsujimura & Koizumi, 2021)

Table 2-2. Dimensional structure of the item candidates for CSMID

		PC1	PC2	PC3	PC4	PC5	PC6	Existing scale <sup>†</sup>
PC4: Fulfillment of physiological needs ( $\alpha = .786$ , $\omega = .770$ )								
COSMID 5	Does not worry about physical symptoms	-.06	0.03	0	<b>0.92</b>	-.30	-.07	
COSMID 3	Does not worry about defecation	0.11	0.08	-.31	<b>0.69</b>	0.15	0.21	
COSMID 4	Sleeping well	-.30	0.06	0.19	<b>0.67</b>	-.03	-.30	
COSMID 1	Does not worry about meals	0.27	0.17	0	<b>0.63</b>	-.20	0.05	
COSMID 2	Does not worry about urination	0.28	0.02	-.26	<b>0.4</b>	0.2	0.15	
PC5: Proactive action								
ODY 2	Self-paced lifestyle	-.05	0	-.26	-.19	<b>0.84</b>	-.06	Being yourself
ODY 3	Altruistic actions	0.21	-.06	0.19	-.20	<b>0.68</b>	-.04	Being yourself
QLDJ 9	Makes or indicates choices...	-.07	0.11	0.05	0.13	<b>0.66</b>	0.42	Expressing self
ODY 5	Doing favorite stuffs/activities	0.18	-.05	0.38	0.17	<b>0.42</b>	0.08	Enjoyment of activities
PC6: Emotional stability								
QLDJ 18	Talks about feeling unsafe...	-.09	-.14	-.01	0.03	0.01	<b>0.68</b>	Expressing self
QLDJ 19	Is irritable or easily...	-.10	-.06	-.21	-.28	0.38	<b>0.68</b>	Experiencing minimum negative behaviors
QLDJ 10	Talks about or continues...	0.3	0.09	0.04	0.16	0.34	<b>0.47</b>	Expressing self
QLDJ 5	React with pleasure to...	-.01	0.06	0.19	-.08	0.06	<b>-.45</b>	Interacting with surroundings
QLDJ 16	Is aware of one's...	0.25	0.38	-.02	0.35	0.1	0.01	Expressing self
QLDJ 2	Has a lively facial...	0.37	0.22	0.29	-.07	0.13	-.10	Interacting with surroundings
QLDJ 14	Enjoys voluntary activities such...	0.06	0.32	0.15	-.02	0.36	0.02	Expressing self
QLDJ 6	Shows a sense of...	0.34	0.2	0.19	-.20	0.09	-.11	Interacting with surroundings
COSMID 8	Doing whatever I can do by myself	0.2	0.13	0.28	-.34	0.05	0.25	
QLDJ 8	Is comfort and reassured...	0.13	0.2	0.3	0.15	-.30	0.21	Interacting with surroundings
ODY 1	Being proud of himself/herself as a person	0.27	0.15	0.25	-.11	0.18	0.11	Being yourself
Component correlation								
	PC1: Comfortable living	1	0.46	0.28	0.35	0.37	0.01	
	PC2: Presence of others	0.46	1	0.11	0.23	0.36	-.06	
	PC3: Interaction with others	0.28	0.11	1	0.15	0.14	0.26	
	PC4: Fulfillment of physiological needs	0.35	0.23	0.15	1	0.35	-.05	
	PC5: Proactive action	0.37	0.36	0.14	0.35	1	-.13	
	PC6: Emotional stability	0.01	-.06	0.26	-.05	-.13	1	

Note. Principal component analysis was applied using Promax rotation.

Kaiser's criterion for components with eigenvalues >1.

<sup>†</sup>Abbreviations: QLDJ: Japanese Quality of Life Instrument for Older Adults Experiencing Dementia (Yamamoto-Mitani et al., 2002), ODY: ODAYAKA scale

(Tsujimura & Koizumi, 2021 )



Table 3. Corrected item-total correlations of primary and final COSMID items and the final principal component structure

COSMID Items		Principal Component Structure					
		Corrected item-total correlation		Corrected item-subscale correlation		PC1	PC2
		Primary	Final	PC1	PC2	Comfortable living	Fulfillment of physiological needs
		$\alpha=.873$	$\alpha=.880$	$\alpha=.898$	$\alpha=.762$		
		$\omega=.867$	$\omega=.873$	$\omega=.905$	$\omega=.766$		
COSMID 10	Feeling calm	0.81	0.794	0.773	—	<b>0.831</b>	0.096
COSMID 13	Satisfaction with daily living	0.768	0.771	0.821	—	<b>0.865</b>	0.03
COSMID 7	A relaxing living environment	0.735	0.742	0.811	—	<b>0.844</b>	0.02
COSMID 11	Living at my own pace	0.641	0.641	0.64	—	<b>0.648</b>	0.151
COSMID 20	Feeling of being cherished	0.595	0.592	0.667	—	<b>0.804</b>	-0.14
COSMID 21	Feeling of happiness	0.572	0.579	0.685	—	<b>0.814</b>	-0.166
COSMID 19	People who understand me holistically	0.567	0.531	0.571	—	<b>0.685</b>	-0.055
COSMID 12	Living faithfully to my uniqueness	0.543	0.57	0.64	—	<b>0.757</b>	-0.077
COSMID 6	Does not worry about money	0.526	0.473	0.466	—	<b>0.51</b>	0.057
COSMID 9	Someone understands how I want to live	0.523	0.49	0.488	—	<b>0.502</b>	0.176
COSMID 18	Someone listens to me when I am worried	0.475	0.529	0.515	—	<b>0.569</b>	0.112
COSMID 1	Does not worry about meals	0.607	0.575	—	0.649	0.178	<b>0.718</b>
COSMID 3	Does not worry about defecation	0.45	0.447	—	0.552	-0.084	<b>0.914</b>
COSMID 2	Does not worry about urination	0.421	0.367	—	0.694	-0.105	<b>0.833</b>
COSMID 5	Does not worry about physical symptoms	0.371	0.328	—	0.377	0.056	<b>0.495</b>
COSMID 16*	Desires to be helpful to others	0.285	—	Interfactor correlations			
COSMID 4*	Sleeping well	0.25	—	PC1	1	0.372	
COSMID 15*	Enjoyment of social interactions	0.18	—	PC2	0.372	1	
COSMID 14*	Relationship with close ones (including pets)	0.15	—				
COSMID 17*	Someone who understands my health status	0.081	—				
COSMID 8*	Doing whatever I can do by myself	-0.028	—				

\* Items removed from the final scale due to lower correlations with total scores of the remaining items.

### 3.3. Test of internal consistency for COSMID

We examined the reliability of the item candidates for COSMID that added “COSMID17. Someone who understands my health status” loaded on PC2 and “COSMID8. Doing whatever I can do by myself” did not load on any principal component (Table 2-1,2). Table 3 shows the Item-total statistics of the item candidates for COSMID in descending order of Corrected item-total corr. (CITC). All items showed positive correlations, but the correlation coefficients of the six items, namely COSMID16, COSMID4, COSMID15, COSMID14, COSMID17, and COSMID8 were low that did not explain the 10% variance of the total remaining items. We determined that these items contributed less to the scale score and removed them. We conducted a principal component analysis of the responses to the remaining 15 items again and completed COSMID with two subscales: Comfortable living, which comprises 11 items ( $\alpha = .898$ ,  $\omega = .905$ ), and “Fulfillment of physiological needs,” which comprises 4 items ( $\alpha = .762$ ,  $\omega = .766$ ). The reliability coefficients for all 15 items were  $\alpha = .880$  and  $\omega = .873$ . (Table 3)

## 4. Discussion

In this study, we developed the COSMID to measure the comfort in daily life of people with MD based on conceptual analysis. As a result of examining its measurement dimensions, we recognized similar aspects to QOL and unique aspects to comfort in daily life. Furthermore, we examined its reliability. The COSMID comprised two subscales that included comfortable living and fulfillment of physiological needs. It was suggested that the scale uniquely measures comfort in daily life for people with MD.

### 4.1. Dimensional structure of COSMID

To determine how the newly developed scale is placed on the factor space, we analyzed it using the answers to the conceptually similar QLDJ and ODY and found that COSMID had three components: PC1 “Comfortable living” related to QOL, PC4 “Fulfillment of physiological needs” related to ensuring that physiological needs are met, and PC3 “Interaction with others,” which concerns social relationships.

PC1 “Comfortable living” contained QLDJ “4. Appears to be content...” but as with COSMID “13. Satisfaction with daily living,” it is a question about satisfaction, and thus, it is reasonably in the relevant measured dimension, indicating its high independence. Furthermore, PC4 “Fulfillment of physiological needs” is composed of items of comfort and was shown to be a distinct dimension of comfort independent of other scales. The former two aspects could be considered as the axes that stand independently even while accounting for the components of other similar scales. COSMID “8. Doing whatever I can do by myself” did not show commonalities with any other item. This may be explained by the fact that while the participants of the concept analysis had varying severities of dementia, the participants of this study had MCI and MD with fewer effects on activities of daily living (ADL) and social activity and might have shown a different dimension.

### 4.2. Test of reliability and validity for COSMID

The content validity of COSMID is generally achieved, given that it comprises components extracted from a concept analysis.

The items of “PC1. Comfortable living,” which indicates a life without anxiety and a feeling of peace adequately

reflected “Living in a calm state of mind” and “People who understand me holistically,” which were the results of a concept analysis of previous studies. “PC4. Fulfillment of physiological needs” reflected “Ensured fulfillment of physiological needs,” such as meals, elimination and sleep in the concept analysis, and can be considered to demonstrate the construct validity of the core aspects of comfort in a person with MD. Moreover, the fact that PC3 “Interaction with others” formed components with groups of similar items of QOL for people with dementia also demonstrated construct validity.

The complete version of COSMID indicated high internal consistency, the reliability coefficients were  $\alpha = .880$ ,  $\omega = .873$ . The scale comprised subscales PC1 “Comfortable living” ( $\alpha = .898$ ,  $\omega = .905$ ) and PC4 “Fulfillment of physiological needs” ( $\alpha = .762$ ,  $\omega = .766$ ). It was suggested that COSMID is a scale that measures adequacy of the comfort unique to the person in individual life.

### **4.3. Practicality of COSMID**

This scale is a tool that can measure the comfort in the daily life of people with MD living in the community. The questions are expressed in simple terms, and the number of items is small. Hence, the burden of answering is insubstantial, and it is possible for people with MD to answer the questions on their own. In other words, it is possible to measure the peace of mind of the concerned individual, and it is not merely an evaluation by others. Moreover, such tools can potentially be used by healthcare professionals, care givers, and social institutions to better understand their lifestyle and—if there is such need—to provide adequate support. By using this tool, it is possible to consider support for people with MD to live comfortably in the community, and we believe that it would be useful for improving their QOL.

### **4.4. Limitation**

Although this study was significant in that it targeted people with dementia, its reliability was not verified with confirmatory factor analysis owing to the small sample size of 72. Originally, the options were on a 4-point Likert scale similar to the existing external scale, but a 3-point evaluation was adopted because the accuracy of the answers obtained was prioritized. This might have influenced the strength of the correlation. The boundaries between MCI and MD in community dweller are unclear. Therefore, we did not specify the number of participants for each. However, it cannot be denied that the results may be biased depending on the number of participants. In the future, it is necessary to search for a method that can more accurately evaluate the comfort in daily life and to refine the measurement.

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### **Disclosure statement**

The authors declare no conflict of interest.

**Data availability**

Not applicable

**Author contributions**

Ms. Suzuki involved in the entire process of this research and wrote the paper. Prof. Tanigaki provided guidance and advice throughout the process of carrying out this research. Prof. Iwata designed the analysis and provided advice on performed the analysis and wrote the paper.

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