Development and Psychometric Evaluation of a Fear of Dementia Scale for Community-Dwelling Older Adults

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ABSTRACT

Background: Negative attitudes toward dementia may pose an obstacle to the early diagnosis and treatment of this syndrome. However, because no scale has been designed to measure fear of dementia, a reliable and valid instrument that is able to measure accurately the multifaceted attributes of fear of dementia must be developed.

Purpose: This study was designed to develop a scale to measure fear of dementia in community-dwelling older adults and to examine its validity and reliability.

Methods: A preliminary version of the measurement scale was developed using a literature review and conceptual framework. Expert analysis of content validity, item analysis based on classic test theory and item response theory, factor analysis, reliability analysis, criterion validity test, and a Rasch model analysis were performed for the psychometric evaluation. Data were analyzed using SPSS 22.0, AMOS 22.0, and WINSTEPS 3.92.1.

Results: The factor analysis revealed three dimensions, five factors, and 19 items that explain 78.44% of the total variance. The three dimensions are cognitive, social, and physical, and the five factors are (a) direct experience of precursor symptoms of dementia, (b) preliminary knowledge of dementia, (c) concerns about family burden, (d) shame, and (e) physical response.

Conclusions: The Fear of Dementia Scale for older adults was shown to be valid and reliable. Therefore, this scale may be used to accurately measure the fear of dementia in elderly individuals. Using this scale to identify the level of fear of dementia will facilitate the early diagnosis, treatment, and prevention of dementia.

KEY WORDS: dementia, fear, psychometrics, Rasch.

Introduction

Dementia is associated with degenerative changes to the brain marked by such physical and mental symptoms as wandering, delusion, and depression, with increasing severity leading to decreased self-management ability and increased treatment difficulties (Alzheimers New Zealand, 2016; Lee, 2013). In particular, older individuals with late-stage dementia must depend partly or entirely on others for daily activities, which severely burdens the family or caregiver (Kwon & Tae, 2014). Thus, dementia has recently overtaken cancer as the condition feared most by older individuals (Alzheimer’s Association, 2014).

Fear of dementia influences the ability of older individuals to improve their daily habits and encourages them to be overly optimistic regarding their ability to prevent its onset and progression (Kim, Kim, & An, 2016). Moreover, this fear, in combination with related negative attitudes and stereotypes, may delay older individuals from undergoing screening and obtaining early diagnoses that would otherwise offer maximum benefit from available treatments and reduce disease progression (Batsch, Mittelman, & Alzheimer’s Disease International, 2015). Moreover, the ability to measure fear of dementia may positively influence the development of dementia-related health policies and service system plans as well as modify misunderstandings and stereotypes about this syndrome (Batsch et al., 2015; Corner & Bond, 2004). Accordingly, although identifying accurately the level of fear of dementia in older individuals is necessary, the lack of a relevant scale has encouraged the use of indirect measurements using other scales such as “attitudes toward dementia,” “risk of dementia,” “perceived threat of Alzheimer’s disease,” and “concerns about Alzheimer’s disease” (Connell, Roberts, McLaughlin, & Akinleye, 2009; Kim & Jung, 2015; Sun, Gao, & Coon, 2015). Because these indirect measurements address overall attitudes toward dementia and/or the fear of contracting dementia on an emotional level, they are limited in their ability to take into account fears related to economic issues, social relationships, and physical changes.

Moreover, perceptions and attitudes toward dementia differ depending on culture, ethnic origin, and healthcare services, which in turn influence the diagnosis of and choice of care for dementia (Chin, Negash, & Hamilton, 2011). For
example, older individuals in Korea have more severe stigmatizing attitudes toward dementia than their counterparts in the United States or the United Kingdom. However, older Koreans are more positive regarding the early detection of dementia and seek to share with their family the fact that they have contracted dementia (Boustani et al., 2008; Justiss et al., 2009; Kim & Jung, 2015). Given the differences in the perceptions and fears regarding dementia across different sociocultural backgrounds, it is important to develop a tool that addresses these differences and the multifaceted factors affecting fear of dementia. The Korean Version of the Fear of Alzheimer’s Disease Scale (K-FADS; Moon, Kim, Choi, Oh, & Han, 2014) was translated from the FADS (French, Floyd, Wilkins, & Osato, 2012). The participants in the FADS development study were mostly White and African American individuals (93%; French et al., 2012). Furthermore, the K-FADS uses cancer and AIDS as examples of diseases in the item “I worry about developing Alzheimer’s disease more than I worry about developing other diseases.” However, because the most dreaded disease among the older people in Korea after dementia is cerebral vascular disease (Koo, Cho, Ahn, Cho, & Park, 2016), this item should be modified accordingly.

Therefore, this study was conducted to develop a scale to measure fear of dementia with sufficient validity and reliability. The Fear of Dementia Scale (FODS) developed in this study is expected to measure accurately the fear of dementia in older individuals, discriminate the levels of this fear, and facilitate early detection. Moreover, this measurement is expected to provide a foundation for implementing dementia-fear prevention programs and to be a component of effective management strategies designed to combat this fear. Therefore, the purpose of this study was to develop a scale that measures the level of fear of dementia experienced by community-dwelling older individuals and then to verify the validity and reliability of this scale.

Methods

Measurement Development Phase

On the basis of the results of a conceptual analysis of fear of dementia (Lee & Jung, 2018), this study confirmed the attributes of fear of dementia and developed the preliminary item pool based on the concept of anxiety sensitivity posited in the expectancy theory of fear of Reiss and McNally (1985). A group of 12 experts validated the content validity of the developed item pool over two rounds of feedback. A 5-point Likert scale was established for each item.

Measurement Evaluation Phase

A 105-item survey was developed, constituting 65 preliminary items developed by the researcher, 10 items addressing general characteristics, and 30 items adopted from the K-FADS for verification of criterion validity. The survey was completed by respondents who were all over 65 years old; had no previous experience with dementia, mild cognitive impairments, cerebrovascular diseases, depression, panic disorder, or anxiety disorder; and had no problems communicating. Data were collected at four elderly welfare centers in Seoul, Republic of Korea. The researcher and two research assistants delivered the survey to 250 participants between March and April 2017. Two hundred thirty-three surveys were used in the data analysis. The 17 surveys excluded from data analysis included 12 surveys with missing responses and five surveys that were returned by participants who reported histories of cerebrovascular diseases and depression. The measurement was then subjected to an item analysis of the collected data and to evaluations of construct validity, criterion validity, reliability, and the adequacy of scale categories and item difficulties to verify the validity and reliability of the measurement.

Item analysis

Descriptive statistics: Items with extreme values for averages, standard deviations, kurtosis, or skewness were considered for deletion, with such results interpreted as reflecting disparate comprehension of item meaning or low item discrimination (DeVellis, 2017).

Correlation analysis: The correlation coefficients between items and between an item and the total score of its related subfactor were analyzed using $r$, and in cases of deletion, changes to Cronbach’s $\alpha$ were examined.

Analysis of goodness of fit: The items were analyzed using the Rasch model based on item response theory by calculating each item's goodness-of-fit index (infit MNSQ/outfit MNSQ; MNSQ means mean-square) and the point measure correlation.

Exploration of dimensionality

Exploratory factor analysis: After confirming the items to be appropriate for exploratory factor analysis (EFA) using the Kaiser–Meyer–Olkin test and Bartlett’s test of sphericity, EFA was conducted using principal axis factoring with promax rotation, which allows for correlations between factors.

Verification of criterion validity

Korean version of the Fear of Alzheimer’s Disease Scale: In this study, the relationship between the measurement results of the scale developed in this study and those of K-FADS was analyzed. The Cronbach’s $\alpha$ of K-FADS was measured as .96 at the time of development.

Numerical Rating Scale: The scores on the Numeric Rating Scale (NRS), ranging between 1 and 5, are used to measure level of fear toward dementia. The measurement results of the scale used in this study were analyzed in terms of their correlations.

Intergroup differences: Difference tests were conducted on the data of groups that, respectively, reported having and not having fear of dementia to verify criterion validity. The difference was assessed using the question “Are you afraid of having dementia?” on a “yes/no” basis.
**Verification of reliability**

Internal consistency reliability: Cronbach’s $\alpha$ was calculated.

Reliability analysis of the Rasch model: Separation Index (SI) and Separation Reliability Index (SRI) were used.

**Evaluating the adequacy of the scale category and item difficulties**

Evaluation of scale category adequacy: To evaluate the adequacy of the five response categories for the measurement of fear of dementia developed in this study, the goodness-of-fit index of the Rasch model, differences between observed average values and sample expected values, and Andrich thresholds were confirmed, followed by drawing the category probability curve (CPC).

Evaluation of item difficulties: The person–item mapping from the Rasch model was reviewed to confirm the level of fear of dementia and the difficulty of the measurement items.

**Data Analysis**

The collected data were analyzed using IBM SPSS Statistics 22.0 (IBM, Inc., Armonk, NY, USA), AMOS 22.0 (IBM, Inc., Armonk, NY, USA), and WINSTEPS 3.92.1 (Linacre, 2019). The general characteristics of the participants were analyzed using descriptive statistics analysis; an item analysis was conducted using descriptive statistics (average, standard deviation, kurtosis, and skewness); and correlations between items and between each item and the total score were assessed using Pearson’s correlation coefficient, item goodness-of-fit index of the Rasch model, and point measure correlation analysis. An EFA was conducted to explore the dimensionality of the measurement. Criterion validity was assessed using Pearson’s correlation coefficient, Spearman’s rank coefficient, and independent $t$ tests. The evaluation of reliability was performed using Cronbach’s $\alpha$ and the SI and SRI of the Rasch model. The Rasch model category function analysis was used to evaluate the adequacy of the five response categories, followed by an analysis of the distribution of participants–items to elicit the distribution of item difficulty and respondent abilities.

**Ethical Considerations**

Ethical approval for the study was obtained from the institutional review board (No. 126-9). The researchers explained the purpose of the study, and informed consent was obtained from all of the participants.

**Results**

**Measurement Development Phase**

*Formation of preliminary items based on the conceptual framework*

The “fear of dementia” concept was analyzed into cognitive, emotional, social, and physical domains based on the anxiety sensitivity concept, which was established in the expectancy theory of fear (Reiss & McNally, 1985) and the conceptual analysis of the “fear of dementia” concept (Lee & Jung, 2018). Moreover, each domain that was formed focused on the characteristics of fear of the consequences of having dementia, and 53 first-round preliminary items were devised based on these domains.

**Test of content validity by experts**

Experts were consulted over two phases to analyze content validity. These experts comprised of professors of nursing and psychology and directors/managers of a nursing home. The expert consultations led to the identification of four domains (cognitive, emotional, social, and behavioral), 15 attributes, and 65 items.

**Measurement Evaluation Phase**

**Participant characteristics**

The general characteristics of the 233 participants in the study are shown in Table 1. One hundred thirty-six were female (58.4%), the average age was 76.5 ($SD = 6.2$) years, 140 were married (60.1%), and 29 had no formal education (12.4%).

**Item analysis**

*Descriptive statistics*: Considering the results of the overall analysis of the average, standard deviation, kurtosis, and skewness of the preliminary items as well as the conceptual framework of the study, seven of the 65 items were deleted. Five of the deleted items had low mean, high skewness, and large kurtosis values, and two of the deleted items had large means.

*Interitem correlation*: Correlation analysis of the 58 items remaining from the descriptive statistics analysis led to the deletion of a further 18 items. Nine of the deleted items had low correlations with other items within their domains and were deemed unable to express the content of the applicable domain, and the remaining deleted items had correlations

| Characteristic      | $n$ | %  |
|---------------------|-----|----|
| Gender              |     |    |
| Female              | 136 | 58.4|
| Male                | 97  | 41.6|
| Age (years; M and SD) | 76.5 | 6.2 |
| With spouse         |     |    |
| Yes                 | 140 | 60.1|
| No                  | 93  | 39.9|
| Education           |     |    |
| None                | 29  | 12.4|
| Elementary school   | 52  | 22.3|
| Middle school       | 44  | 18.9|
| High school         | 65  | 27.9|
| University or above | 43  | 18.5|
that were much higher than other items. The researcher deleted the items taking into consideration the correlations between the items and their content.

**Item–overall score correlation and internal consistency:** The analysis of the item–overall score correlation and the internal consistency of the 40 items that remained after interitem correlation analysis indicated correlation coefficients of \( r = .340–.769 \), with no items falling below the .30 threshold. Furthermore, none of the deleted items caused significant change to the Cronbach’s \( \alpha \) values.

**Goodness of fit of items according to the Rasch model:** The goodness-of-fit analysis for the items was conducted based on the Rasch model in two phases on the 40 items remaining from the analysis of the descriptive statistics and the interitem and item–total score correlation analyses. The results led to the deletion of 10 items that had goodness-of-fit indices below 0.6 or over 1.4, leading to the selection of 30 items. Moreover, items with less than .30 point measure correlations were considered insufficient for measuring the construct. However, the point measure correlations of the remaining 30 items ranged between .44 and .71 and were thus deemed appropriate to measure the construct.

**Exploration of dimensionality**

**Exploratory factor analysis:** The Kaiser–Meyer–Olkin values of the 30 items were found to be .933, and the Bartlett’s test of sphericity value was found to be statistically significant \( (\chi^2 = 5484.71, df = 435, p < .001) \), which confirmed that the data were suitable for factor analysis.

The first EFA extracted five factors with eigenvalues greater than 1.0, and the cumulative explanatory power was found to be 69.25%. Communality ranged between .446 and .783. As the communality of each item was above .30, these items were deemed to have significant explanatory power (Tak, 2007). However, seven items showed similar factor loading values on multiple factors and tended to tie into factors that were not suited to the conceptual foundations of this study and were thus deleted (Table 2).

The 23 items chosen from the first EFA were used for principal factoring, and the number of factors used was fixed at five, which were selected during the first factor analysis. The cumulative explanatory power of the second factor analysis increased to 74.15%. Four of the items showed similar factor loading values and were tied into factors that did not match the conceptual framework in this study. Moreover, these items were deleted as they were deemed to overlap with other items. Therefore, four items were deleted in the second EFA, resulting in the selection of 19 items (Table 2).

Table 3 shows the results of the EFA after fixing the final 19 items to the five factors. Factor 1 included five items (S6, S7, S8, S9, and S11), Factor 2 included five items (C4, C6, C8, C11, and C12), Factor 3 included four items (B1, B2, B3, and B4), Factor 4 included three items (S12, S15, and S18), and Factor 5 included two items (C2 and C3). The cumulative explanatory power was determined to be 78.44%.

**Final items of the Fear of Dementia Scale**

On the basis of the above, the final version of the newly developed FODS contains three dimensions, five factors, and 19 items (Table 2). A 5-point Likert scale was established for each item (1 = not at all likely, 2 = rarely likely, 3 = generally likely, 4 = often likely, and 5 = very likely), with a higher overall score indicating higher fear of dementia.

**Verification of criterion validity**

To verify the criterion validity, the level of fear of dementia, as calculated using the NRS as ranging from 1 to 5 through 30 items of the K-FADS and FODS, was analyzed for correlation. The Pearson’s correlation coefficient between the total score of the 19 items in FODS and those in K-FADS was .794 \( (p < .001) \); the Spearman’s rank correlation coefficient between the FODS value and fear of dementia as measured using the NRS was .408 \( (p < .001) \).

The participants who responded that they feared dementia \( (n = 192, 82.40\%) \) and those who said that they did not \( (n = 41, 17.59\%) \) were distinguished into two groups. Their intergroup differences in terms of fear of dementia were compared using the measurement developed in this study. Their average FODS scores for fear of dementia were 55.06 and 38.18, respectively. Moreover, the independent \( t \) test indicated that the FODS scores of the “afraid of dementia” group were significantly higher than those of the “not afraid of dementia” group \( (t = 5.724, p < .001) \).

**Verification of reliability**

**Reliability of internal consistency:** The Cronbach’s \( \alpha \) value for each factor ranged between .849 and .923, and the Cronbach’s \( \alpha \) value for the 19 items was .927 overall.

**Reliability analysis of the Rasch model:** The SI was 2.32 for the participants for the final measurement, and the SRI was .84. The SI for the items was 9.48, and the SRI was .99. A larger SI indicates higher measurement accuracy, with measurements deemed acceptable at \( \geq 1.5 \), good at > 2.0, and very good at > 3.0 (Bond & Fox, 2007). The SI of the participants in this study was 2.32, indicating a good level of measurement accuracy, whereas the SI for the items was 9.48, indicating a very good level of measurement accuracy. The SRI of the participants was good at over .80, whereas the SRI of the items was very good at .99. The results indicate that the developed FODS adequately distinguishes between the respective abilities of participants and items.

**Examination of response categories and item difficulties**

**Analysis of scale category adequacy:** To confirm the adequacy of the 5-point Likert scale range for FODS, a Rasch model was used to analyze the category function and draw the CPC. A scale category goodness-of-fit index greater than 1.4 or less than 0.6 is considered inappropriate, and the category is deemed appropriate when the difference between the observed average values and the expected values is low and...
TABLE 2.  
*The Result of the First (30 Items) and Second (23 Items) Exploratory Factor Analyses (N = 233)*

| Dimension   | Item No. | Item                                                                 | Factor (First EFA) | Factor (Second EFA) |
|-------------|----------|----------------------------------------------------------------------|--------------------|---------------------|
| Social      | S9       | I am afraid of getting dementia because it would lead to economic woes. | .783               | .864 .476 .297 .577 .283 |
|             | S8       | I am afraid of getting dementia because I may be unable to take care of my family. | .765               | .859 .534 .249 .575 .326 |
|             | S7       | I am afraid of getting dementia because I may present an economic burden to my family. | .775               | .847 .523 .217 .528 .275 |
|             | S6       | I am afraid of getting dementia because I may be a burden to my family. | .775               | .815 .551 .181 .590 .295 |
|             | S11      | I am afraid of dementia because I may be unable to support my family economically. | .756               | .804 .426 .231 .561 .202 |
|             | B7       | I am afraid of getting dementia because I may not be able to carry out my daily activities by myself (e.g., wearing clothes, washing, eating) | .726               | .697 .640 .381 .668 .402 |
|             | B8       | I am afraid of getting dementia because I may do things that I myself do not know of (e.g., doubting, obsessing, wandering, repeated behaviors, putting feces on walls, etc.) | .692               | .686 .603 .334 .656 .351 |
|             | B6       | I am afraid of getting dementia because I may have to depend on others to live. | .585               | .645 .579 .403 .561 .422 |
| Cognitive   | C6       | I am afraid of dementia because they say that dementia has no cure. | .740               | .544 .862 .344 .511 .498 |

(continues)
### TABLE 2.
The Result of the First (30 Items) and Second (23 Items) Exploratory Factor Analyses (N = 233), Continued

| Dimension       | Item No. | Item                                                                 | Communality | Factor (First EFA) | Factor (Second EFA) |
|-----------------|----------|----------------------------------------------------------------------|-------------|--------------------|--------------------|
|                 |          |                                                                      |             | 1 2 3 4 5          | 1 2 3 4 5          |
|                 |          |                                                                      |             |                    |                    |
| C8              | 23       | I am afraid of dementia because my conditions worsen as time passes. | .742        | .512 .834 .317 .501 | .389 .726 .506 .878 | .290 .509 .439 |
| C11             | 11       | I am afraid of dementia because treatments do not work on dementia.  | .671        | .481 .792 .311 .520 | .380 .657 .469 .811 | .284 .509 .429 |
| C12             | 12       | I am afraid of dementia because treatments do not work on dementia.  | .694        | .559 .788 .264 .526 | .380 .677 .552 .807 | .238 .525 .443 |
| C4              | 4        | When I look at family, neighbors and others who have dementia, I am afraid I may be like them. | .674        | .526 .785 .365 .403 | .527 .612 .514 .746 | .323 .433 .555 |
| Physical        | 3        | Physical response                                                    |             |                    |                    |
| B2              | 2        | I lose sleep if I think about myself getting dementia.               | .755        | .321 .388 .906 .445 | .500 .742 .304 .338 | .899 .447 .496 |
| B3              | 3        | My heartbeat increases if I think of myself getting dementia.        | .748        | .311 .355 .896 .444 | .421 .745 .289 .300 | .888 .443 .429 |
| B4              | 4        | My hands sweat if I think of myself getting dementia.               | .627        | .281 .346 .784 .392 | .457 .616 .262 .309 | .790 .410 .469 |
| B1              | 1        | I lose my appetite if I think of myself getting dementia.           | .609        | .326 .381 .768 .457 | .408 .593 .305 .347 | .774 .452 .419 |
| Social          | 4        | Shame                                                                |             |                    |                    |
| S18             | 18       | I am afraid of getting dementia because those around me would think I am mentally challenged. | .674        | .536 .471 .440 .864 | .236 .666 .515 .446 | .425 .836 .270 |
| S15             | 15       | I am afraid of getting dementia as I may lose face.                 | .655        | .569 .542 .405 .790 | .266 .652 .551 .532 | .387 .819 .304 |
| S12             | 12       | I am afraid of people knowing that I have dementia.                 | .573        | .603 .420 .433 .723 | .312 .563 .586 .371 | .410 .739 .344 |
| S2              | 2        | I am afraid of getting dementia because my family and friends will avoid me. | .694        | .635 .664 .358 .711 | .284 .694 .635 .664 | .358 .711 .284 |
| Cognitive       | 5        | Direct experience of precursor symptoms of dementia                 |             |                    |                    |

(continues)
### TABLE 2.
The Result of the First (30 Items) and Second (23 Items) Exploratory Factor Analyses (N = 233), Continued

| Dimension | Item No. | Item                                                                                                      | Factor (First EFA) | Factor (Second EFA) |
|-----------|---------|-----------------------------------------------------------------------------------------------------------|--------------------|--------------------|
|           |         |                                                                                                           | Communality 1 2 3 4 5 | Communality 1 2 3 4 5 |
| C3        | I am afraid if I may have contracted dementia as my cognitive abilities have decreased as of recent (e.g., losing things often, forgetting what I had just said, I cannot remember what I want to say, etc.) | .702 .239 .453 .466 .281 .889 | .692 .232 .431 .444 .293 .867 |
| C2        | I am afraid if I may have contracted dementia as my memory has been poor as of recent.                  | .701 .269 .476 .477 .287 .886 | .695 .258 .447 .454 .304 .875 |
| E8        | I will be anxious if I have dementia.                                                                     | .531 .600 .596 .279 .532 .209 |                      |
| E11       | Even if my memory is normal right now, I am afraid that I may get dementia in the future.               | .612 .573 .744 .416 .486 .455 | .700 .674 .585 .334 .709 .484 |
| C21       | I become more and more afraid of contracting dementia as I get older.                                    | .605 .504 .717 .372 .380 .525 | .674 .665 .543 .289 .698 .427 |
| C14       | I am afraid of dementia because with age, everyone seems to get it.                                       | .446 .343 .490 .498 .480 .490 | .567 .603 .605 .326 .658 .337 |
| S4        | I am afraid of dementia because I may not be able to engage in social activities (e.g., class reunions, hobby groups). | .717 .746 .682 .376 .697 .325 | .561 .621 .511 .359 .602 .487 |
| S3        | I am afraid of getting dementia because I may not be able to recognize my family and friends.             | .781 .733 .749 .376 .700 .314 |                      |
| S1        | I am afraid of getting dementia as I will be alone.                                                      | .579 .590 .614 .396 .592 .314 |                      |

**Eigenvalue**
- First EFA: 13.47 2.94 2.11 1.22 1.01
- Second EFA: 10.19 2.76 1.92 1.17 0.99

**Explained variance (%)**
- First EFA: 44.90 9.83 7.05 4.07 3.38
- Second EFA: 44.33 11.99 8.38 5.10 4.33

**Cumulative variance (%)**
- First EFA: 44.90 54.73 61.79 66.86 68.25
- Second EFA: 44.33 56.32 64.71 69.82 74.15

Note. The item numbers in bold indicate deleted items. Item: S = social; B = behavioral; C = cognitive; E = emotional. EFA = exploratory factor analysis.
the Andrich threshold is gradually increasing (Chi, 2001). In this examination, the infit and outfit MNSQ of the scale categories ranged between 0.73 and 1.36, indicating that the goodness-of-fit index levels were appropriate and the differences between the observed average values and the sample expected values were sufficiently small, at 0.03–0.08. However, the Andrich thresholds between Categories 2 and 3 and between Categories 3 and 4 were reduced, with the Andrich threshold not increasing by phase between the five categories. Therefore, it may be necessary to reconsider the 5-point Likert scale.

The CPC over all of the items is shown in Figure 1, which analyzes the participant responses to the 5-point scale categories used in this study. The thresholds between Categories 1 and 2, 2 and 3, 3 and 4, and 4 and 5 were not sequential. Moreover, the sizes of the gaps between thresholds were not regular. These findings indicate that the participants had difficulty discriminating between the scale categories when responding to each category (Seol & Yu, 2015).

**Evaluation of item difficulties:** The respondent ability–item distribution was drawn from the Rasch model to confirm the item difficulty levels of the FODS and the levels of fear of dementia. Analysis of this distribution found that the most difficult item for the participants was B4 and the easiest item was S6. Moreover, comparing the distribution of participant abilities and item difficulties, the item difficulties and the level of fear of dementia of the participants were distributed, for the most part, close to the average ability value. However, the items were generally located below the average abilities of the respondents. Thus, the FODS appears to consist of items useful for sorting respondents with a relatively low fear of dementia (Boone, Staver, & Yale, 2014).

**Discussion**

Measurements developed to assess concepts that are different but similar to the concept of fear of dementia or the translated measurements have been used to measure fear of dementia (Connell et al., 2009; Kim & Jung, 2015; Moon et al., 2014; Sun et al., 2015). However, these prior measurements lack reliability and validity. Therefore, the FODS developed

**TABLE 3.**

| Item No. | Communality | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 |
|---------|-------------|----------|----------|----------|----------|----------|
| S7      | .761        | .865     | .517     | .236     | .478     | .221     |
| S8      | .749        | .864     | .528     | .271     | .519     | .257     |
| S9      | .749        | .863     | .467     | .320     | .511     | .208     |
| S11     | .733        | .813     | .416     | .249     | .524     | .137     |
| S6      | .749        | .807     | .539     | .206     | .520     | .220     |
| C8      | .724        | .480     | .883     | .309     | .451     | .383     |
| C6      | .723        | .517     | .867     | .364     | .444     | .440     |
| C11     | .647        | .442     | .804     | .304     | .443     | .382     |
| C12     | .665        | .527     | .802     | .261     | .451     | .389     |
| C4      | .591        | .479     | .746     | .346     | .342     | .494     |
| B2      | .736        | .281     | .333     | .900     | .423     | .475     |
| B3      | .741        | .264     | .295     | .897     | .414     | .398     |
| B4      | .604        | .238     | .310     | .792     | .393     | .441     |
| B1      | .579        | .295     | .346     | .770     | .463     | .409     |
| S18     | .619        | .501     | .427     | .437     | .860     | .226     |
| S15     | .639        | .532     | .526     | .403     | .844     | .242     |
| S12     | .553        | .571     | .362     | .427     | .732     | .284     |
| C3      | .688        | .201     | .434     | .456     | .236     | .905     |
| C2      | .687        | .228     | .450     | .465     | .246     | .895     |

**Note.** Item: S = social; C = cognitive; B = behavioral.
in this study is a tool with verified reliability and validity that measures fear of dementia in older Korean individuals while taking into account Korean sociocultural characteristics.

On the basis of the anxiety sensitivity concept in the expectancy theory of fear (Reiss & McNally, 1985), which consists of three dimensions (cognitive, social, and physical); a literature review; and interviews, a 53-item or four-dimension (cognitive, emotional, social, and physical) scale was constructed in this study. On the basis of the results of the expert content validity test, the physical dimension was reclassified as the behavioral dimension, and 65 items were generated. In the item analysis and EFA phase, the emotional dimension was deleted and the behavioral dimension was reverted to the physical dimension because all emotional dimension and behavior-related items were removed and items related to physical response were retained. Thus, the FODS includes three dimensions (cognitive, social, and physical), five factors, and 19 items that were derived from a combination of theory and empirical research.

Although individuals with a high fear of dementia tend to have a positive attitude when striving to prevent dementia through health promotion behaviors, excessive fear may induce physical symptoms and stress that bring negative results (Lazarus, 1966; Zeng et al., 2015). An appropriate level of fear of dementia may encourage individuals to cultivate healthy behaviors and induce change. A previous study found that participants who did not fear dementia were confident that they would not develop dementia because they strived to maintain good health and had no family history of dementia (Lee & Jung, 2018). Therefore, attempts to maintain health and confidence regarding self-ability to avoid dementia have been considered important characteristics relating to fear of dementia. However, no items relating to these factors were included among the final items of the FODS. Although knowledge of and attitudes toward dementia are important factors that influence dementia prevention behavior (Lee, Woo, Kim, Lee, & Im, 2009), it appears unnecessary to include preventative behavior in fear-of-dementia measurement tools. However, this measurement is meaningful in that it assesses level of fear of dementia, which may lead to dementia prevention or health promotion behaviors.

Analysis of the respondent’s ability–item distribution found that the items generally have information regarding participants with low fear-of-dementia levels. This indicates that the FODS may include items that identify participants with low fear-of-dementia levels. Thus, in this study, although the FODS identified participants who are afraid of dementia, it was most effective in discriminating among participants with relatively low levels of fear.

The analysis indicated that the scale category goodness-of-fit indices were appropriate. However, as the thresholds between the five categories were not sequential and the sizes of the gaps between the thresholds were irregular, the appropriateness of the 5-point Likert scale was not fully verified. In addition, because the participants in this study were all over 65 years old, they had some difficulties understanding how to use the 1–5 Likert scale and required repeated explanations from the researchers. On the basis of this, future research should try to identify a more appropriate scale scoring method.

A future study using confirmatory factor analysis should be conducted on a new sample to validate the dimensionality and structure of the FODS developed in this study.

![Figure 1. Category probability curve (numbered curves denote different categories).]
Furthermore, the Cronbach’s α in this study ranged between .849 and .923 for each subscale, and the overall Cronbach’s α for the 19 items was excessively high (.927). According to DeVellis (2017), the optimal range of Cronbach’s α is .80–.90, and Cronbach’s α values over .90 suggest that the total number of scale items should be reduced. Moreover, given that the FODS is designed to be used with individuals over 65 years old, further reducing the number of items should be considered in future studies.

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Study conception and design: ML, DJ
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Data analysis and interpretation: ML
Drafting of the article: ML, DJ
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