

Development and Evaluation of Content Validity and Acceptance of a Multidomain Intervention Module for Reversal of Cognitive Frailty Among Older Adults

Norhayati Mustafa Khalid¹, Pavapriya Ponvel¹, Azianah Mohamad Ibrahim¹, A'isyah Mohd Safien¹, Nurul Hidayah Md Fadzil¹, Devinder Kaur Ajit Singh¹, Arimi Fitri Mat Ludin¹, Norhayati Ibrahim¹, Ponnusamy Subramaniam¹, Hasnah Haron¹, Roslee Rajikan¹, Divya Vanoh², Suzana Shahar¹

¹Center for Healthy Aging and Wellness, Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia; ²Dietetics Programme, School of Health Sciences, Universiti Sains Malaysia, Kelantan, Malaysia

Correspondence: Suzana Shahar, Center for Healthy Aging and Wellness, Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Jalan Raja Muda Abdul Aziz, Kuala Lumpur, 50300, Malaysia, Tel +60 392897163, Email suzana.shahar@ukm.edu.my

Purpose: There is a limited availability of multidomain interventions that target cognitive frailty. Thus, the aim of the present study was to develop and evaluate the content validity and acceptance of the multidomain intervention module to reverse cognitive frailty among older adults (iAGELESS).

Patients and Methods: This study was conducted in two phases: Phase I included the development of the multidomain intervention module iAGELESS and evaluation of content validity, while Phase II consisted of evaluating the acceptance of the module among 18 healthcare and social care providers, 13 older adults with cognitive frailty, and 13 caregivers. Content validity index (CVI) was used to quantify the content validity. Respondents completed a questionnaire which consisted of information on sociodemographic, followed by module acceptance evaluation with respect to content, terminologies, and graphics. The data was then analyzed descriptively.

Results: A multidomain intervention module, iAGELESS was developed. The module was found to have appropriate content validity (overall CVI = 0.83). All the caregivers, 92% of older adults with cognitive frailty and 83% of healthcare and social care providers were satisfied with the overall content of the module. More than 50% of those who accepted the module had satisfactory consensus on the ease of the terminologies, length of sentences, pictures, information, color, and font size included in the module.

Conclusion: The iAGELESS module demonstrated good content validity and was well accepted, thus warranting its utilization in future studies to determine its effectiveness in reversing cognitive frailty among older adults.

Keywords: aging, cognitive frailty, multidomain intervention module, older adults, reversal

Introduction

The global older population is growing at a rapid pace, with older adults defined as persons aged 60 years and over. In 2020, there were 1 billion older adults worldwide, and this figure is expected to increase to 2.1 billion by 2050.¹ Similarly, it is anticipated that the number of older adults in Malaysia will rise to 5.8 million in 2030 from 2.3 million in 2020. With this, the demand for healthcare and expenses to manage older adults who are usually at a greater health risk will increase accordingly.² Both cognitive impairment and physical frailty are important indicators of the ageing process and linked to adverse health outcomes such as disability, hospitalization and death.^{1,2}

Mild cognitive impairment (MCI) is defined as a period of transition between normal cognitive aging and dementia.³ In Malaysia, the prevalence of MCI is reported to be 16%.² Physical frailty is defined as a clinical syndrome that involves having at least three of the following characteristics: unintentional loss of 5 kg weight, exhaustion, weakness, slowness, and low physical activity level.¹ In the Malaysian community dwelling older population, the prevalence of frailty was

reported to be 8.9%.⁴ Cognitive frailty (CF) is defined as a heterogeneous clinical manifestation characterized by the simultaneous presence of physical frailty and cognitive impairment.⁵ Prevalence of cognitive frailty among the Malaysian community dwelling older population was reported at 2.2%. Several risk factors for CF have been established which include increased age, low niacin intake, lack of social support, depression, and lower functional status. Additionally, CF is associated with increased risk of dementia, disability and mortality.⁶

Preventive intervention strategies for physical frailty, MCI and CF are important for the prevention of physical impairments, disabilities and dementia in older adults.⁵ Previous reviews by Toman et al⁷ and Hafdi et al⁸ suggested that multidomain interventions (diet, physical exercise, cognitive training, social activities, and vascular risk management) might be beneficial in maintaining cognitive health. Another recent systematic review also reported that multidomain interventions focusing on cognitive training, dietary improvement, and physical activity could help prevent cognitive decline among older adults, including those at risk of developing dementia.⁹ Dedeyne et al¹⁰ found that multidomain interventions (diet and physical exercise) were more effective than monodomain interventions at improving frailty status and physical functioning.

Furthermore, in a feasibility study, it has been demonstrated that there is potential to reverse CF with multidomain intervention (physical, cognitive, nutritional, and psychosocial) among older adults from lower socioeconomic background.¹¹ A multidomain approach comprised nutritional (a daily dose of Fortisip Multi Fibre, iron, folate, vitamin B6, vitamin B12, calcium, and vitamin D supplements over 24 weeks), physical training (twice a week for resistance and balance exercises) and cognitive interventions (2 hours per week for cognitive-enhancing activities),¹² as well as additional modalities, namely social stimulation (group meetings) and monitoring metabolic and vascular risk factors (which include 3 nurse visits and 3 physician visits)¹³ demonstrated an improved cognition and reduced frailty. The primary outcomes for these studies were frailty score¹² and changes in cognition.¹³ Both studies emphasized the need to incorporate several domains of interventions, such as diet, exercise, cognitive training, social stimulation, and vascular risk monitoring, rather than a singular intervention for the most effective results. However, in these studies, the assessment of the effectiveness of the multidomain intervention was conducted either among older adults with frailty or those at increased risk of cognitive decline but not among individuals experiencing both conditions simultaneously. Additionally, some multidomain interventions missed either psychosocial or vascular risk management components,¹² resulting in a less holistic approach. Furthermore, multidomain intervention for older adults with CF is limited to a feasibility study and focuses solely on older adults from lower socioeconomic backgrounds.¹¹ Thus, we designed a study to determine the effectiveness of an all-inclusive multidomain intervention module (nutrition, psychosocial, physical activity, cognitive training, and vascular risk management) in older adults with cognitive frailty.¹⁴ It is noted that most intervention studies did not report the development process of the intervention module. Thus, the aim of this article is to report the development and evaluation of the content validity and acceptance of the module.

Materials and Methods

Study Design

The study was conducted from October 2020 until December 2021 and consisted of two phases. In Phase I, a multidomain intervention module was developed, covering areas such as nutrition, psychosocial, physical activity, cognitive training, and vascular risk management, alongside an evaluation of the content validity. Phase II involved the evaluation of acceptance. The multidomain intervention module was designed and adapted based on the Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability (FINGER) trial protocol¹⁵ (Figure 1). The study was conducted under the Declaration of Helsinki.

Phase I: Part I: Development of Multidomain Intervention Module

Nutrition Intervention Module

To develop this component, a thorough literature review on recommendations for optimal dietary nutrient intake in older adults^{16–18} was conducted. The gathered data were extensively reviewed to develop the content based on the suitability of dietary habits of Malaysian older adults. Food photos were taken, and a professional artist was hired to design

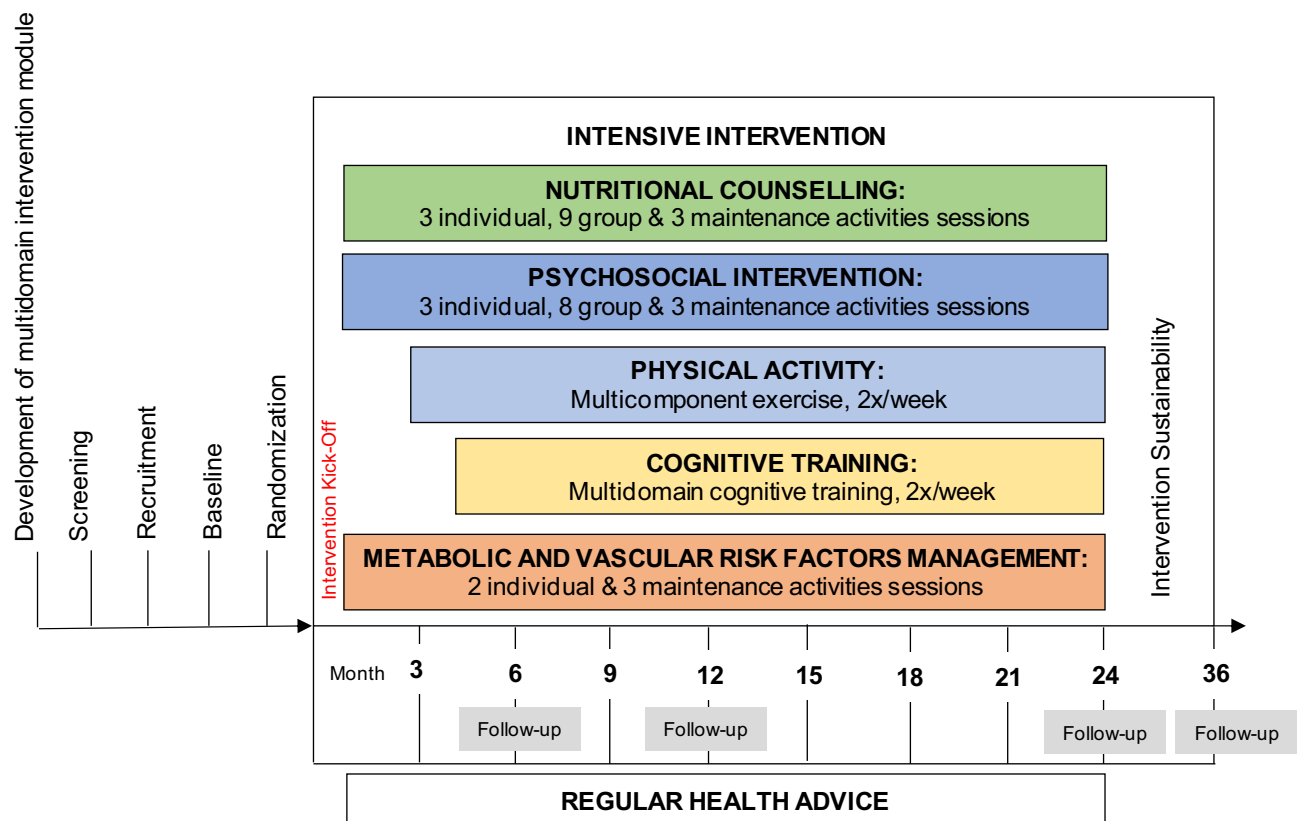


Figure 1 Multidomain intervention module (iAGELESS) timeframe.

illustrations to be included in the module. The content of the nutrition intervention module was finalized through a series of meetings, with the research members consisting of dietitians and nutritionists.

Psychosocial Intervention Module

A comprehensive review of available literature and international guidelines for psychosocial education packages¹⁹ was conducted, followed by its adaptation to develop a psychosocial intervention module. The module was designed using a transtheoretical model to promote positive behavioral changes among participants. The information gathered was extensively reviewed through face-to-face or online meetings with a panel of three psychologists to develop the content of the package based on local contexts.

Physical Activity Intervention Module

The development of the physical activity intervention module involved a literature review on multidomain interventions for the potential reversal of MCI and frailty which was performed for the WE-RISE trial (Warga Emas-Resilient mInd and muScle Exercise).²⁰ The WE-RISE module was adapted and updated for the iAGELESS module to be performed to suit for a longer duration of implementation. This module was then reviewed through a series of face-to-face/online meetings, with content experts comprising physiotherapists, geriatricians, and an exercise physiologist to finalize the contents and graphics of the current module.

Cognitive Training Intervention Module

Similarly, iAGELESS cognitive training intervention module was developed as the physical activity module. This module was reviewed by the research team led by a clinical psychologist.

Metabolic and Vascular Risk Factors Management Intervention Module

Metabolic and vascular risk factors management intervention module was developed based on the national evidence-based guidelines.²¹ The contents of the module were finalized through a series of meetings, with the research team members consisting of geriatricians.

Phase I: Part 2: Evaluation of Content Validity

The purposive sampling method was employed to recruit participants for content validity evaluation. Sample size calculation was determined according to Lynn (1986)²² with at least three individuals required for content validation of each component. Regarding the healthcare experts included in the study, the subjects were chosen from diverse interdisciplinary areas comprising four physicians (two geriatricians and two family health physicians), three academicians in medicine, geriatric medicine and dietetic and six healthcare professionals (two clinical psychologists, two physiotherapists, and one nutritionist and dietician, respectively). The inclusion criteria of the expert panels included those involved in research focusing on nutrition, psychosociology, vascular health, physical activity, cognition, and wellness.

The validation tool was adapted from Clayton's (2009) proposed questionnaire, the Tool to Evaluate Materials Used in Patient Education (TEMPtED).²³ The multidomain intervention module was evaluated based on five criteria: content, motivational principal, literature, arrangement and typography, and graphic.²³ Content validity index (CVI) is most often used for content validity determination, and in this study, expert panels were invited to examine each item and rate it on a scale of 1 to 4 (with 1 being "not relevant", 2 being "some revision required", 3 being "relevant but needs minor revision", and 4 being "extremely relevant").²² The number of expert panels rating an item as relevant (with a rating of 3 or 4) was calculated by dividing it by the total number of expert panels to produce the CVI for relevancy of each item. An index of 0.80 or above for each item was considered acceptable.²⁴ The expert panels were given 2 weeks to review the module followed by video conferencing for roundtable discussion.

Phase II: Acceptance Test

The evaluation of acceptance was carried out using purposive sampling. The sample size was calculated using OpenEpi Software Version 3.01 with hypothesized 2.2% prevalence of cognitive frailty⁶ at 95% confidence level. Thus, the total sample size suggested was 34. After considering 10% dropout, the total sample size needed was 38 subjects. A total of 44 subjects participated in the acceptance test that consisted of 18 healthcare and social care providers, 13 older adults with cognitive frailty, and 13 caregivers.

Inclusion criteria for healthcare and social care providers included those involved in the health care of older adults at hospitals, health clinics and senior citizen centers for the past 6 months. The inclusion criteria for older adults with cognitive frailty were individuals aged 60 to 80 years, community dwellers from the Klang Valley, Malaysia, and meet the following criterion; ie, Mini-Mental State Examination (MMSE) score ≥ 19 and < 26 points, Clinical Dementia Rating Scale (CDR) = 0.5 and fulfilled at least three of Fried's frailty criteria.¹⁴ The selection criteria for caregivers included those who were living or meeting with cognitive frailty, older adults at least once daily and were responsible for managing their food and drink, clothing or shelter. Informal caregivers such as spouses, children, son-in-law, grandsons, close friends and neighbors were also included in the study.

The questionnaire used for this study was adapted from Vanoh et al (2018)¹⁸ which comprised of questions regarding participants' sociodemographic information and assessed the module's acceptability in terms of its content, terminologies, length of sentences, pictures, information, color, font size and elements that required improvement. The evaluation of acceptance was administered through virtual sessions. Data were analyzed descriptively using SPSS version 21.0.

Results

Multidomain Intervention Module

Based on the extensive literature review and FINGER trial protocol, the multidomain intervention module comprised five components, namely nutrition, psychosocial, exercise, cognitive training, and metabolic and vascular risk factors management. The module was prepared in the form of PowerPoint slides accompanied by a manual book, both produced

in the Malay language. The module utilized Arial font with of size of font ranging from 30 to 40 points for title of content and 20–25 points for content, and the font color was set to black over a white background. The topics, activities, learning time and mode of delivery of multidomain intervention module are summarized in [Table 1](#).

Nutrition Intervention Module

The nutrition intervention module contained 12 series that included three individual nutritional counseling sessions, nine group sessions and three maintenance activity sessions conducted within 30 to 60 minutes over a period of 24 months. Individualized nutritional counseling consisted of personalization of the participant's diet and their compliance to the sessions through assessments and monitoring ([Figure 2](#)). Meanwhile, group counseling sessions consisted of talks on various topics such as the Malaysian Healthy Plate, fasting, the importance of nutrient intake on the brain and muscles, menu planning, food safety, and how to read nutritional information. Each session included interactive activities such as online games, video presentations, gardening sessions, and cooking demonstrations. Health maintenance of similar activities as additional sessions was scheduled for month 16th, 20th and 24th.

Psychosocial Intervention Module

The psychosocial intervention module comprised 11 series, consisting of both individual and group sessions. Individual sessions included an evaluation of motivational level of the participants, and counseling session using the Stages of Change model ([Figure 3](#)). Meanwhile, group sessions included multiple psychosocial dimensions such as social support, resilience, self-efficacy, and coping strategies that were conducted through various methods: sharing session, kindergarten visit, talks from professionals, as well as games and reward sessions to support and maintain new healthy behavior. Three health maintenance activities are recommended to be given after one year of intervention that consist of talks, games, and potluck.

Physical Activity Intervention Module

The physical activity intervention module consisted of five components, namely warm-up, aerobic, strengthening, postural balance, and cooling exercise ([Figure 4](#)). It is recommended for the intervention to be performed two to three times per week over a period of 21 weeks. Three health maintenance activity sessions consisting of multicomponent exercise sessions and talks on the importance of physical activity are suggested for implementation.

Cognitive Training Intervention Module

The cognitive training intervention module comprised 16 series of both individual and group sessions. These sessions should be carried out two to three times a week over a period of 20 months. Cognitive exercises included activities such as crossword puzzles, memory games, word search, maze, and spot the differences ([Figure 5](#)). Three booster sessions are to be administered which include cognitive exercises and a talk on cognitive health.

Metabolic and Vascular Risk Factors Management Intervention Module

The metabolic and vascular risk factors management intervention module comprised two series of individual counseling with a physician ([Figure 6](#)). These sessions were aimed to identify the need for initiation or modification of medication, physical activity status and other necessary recommendations for the participants. Medication compliance and body weight were also assessed and monitored. A booster dose was delivered which included a healthy lifestyle talk with reading materials provided.

Content Validity by Expert Panels

The average mean age of the expert panels was 48.0 ± 8.4 years, comprising physicians (30.8%, $n = 4$) and academicians (23.1%, $n = 3$) and healthcare professionals (46.2%, $n = 6$) ([Table 2](#)). As shown in [Table 3](#), all components were subjected to good content validity. The CVI values were 0.82, 0.83, 0.80, 0.86, 0.83 and 0.83 for nutrition, psychosocial,

Table 1 Topics, Activities, Learning Time and Mode of Delivery of the Multidomain Intervention Module

Month	1	2	3	4	5	6	7	8	9	10	11	12	16, 20 and 24
Module													
Nutrition	Series 1.1: -Know Your Needs -Individual counseling -30-60 min -Face to face	Series 1.2: -Malaysian Healthy Plate, Traffic Light DIY & Fasting -Kahoot! -30-60 min -Face to face/online	Series 1.3: -Feed Your Brain -Match Pictures -30-60 min -Face to face/online	Series 1.4: -Eat & Digest -Gardening -30-60 min -Face to face/online	Series 1.5: -Evaluations of needs -Individual counseling -30-60 min -Face to face	Series 1.6: -Keep It Safe -Paste Preparation -30-60 min -Face to face/online	Series 1.7: -Make Your Own DIY -Cooking demonstration -30-60 min -Face to face/online	Series 1.8: -Choose Your Food Wisely -Match picture -30-60 min -Face to face/online	Series 1.9: -Evaluations of needs -Individual counseling -30-60 min -Face to face	Series 1.10: -Read Smart, Shop Smart -Kahoot! -30-60 min -Face to face/online	Series 1.11: -Maintain Body Weight & Strength Your Muscle -Word Search -30-60 min -Face to face/online	Series 1.12: -I Can Handle Myself -Kahoot! -30-60 min -Face to face/online	Booster Dose -Cooking demonstration/ gardening/ interactive games -30-60 min -Face to face/online
Psychosocial	Series 2.1: -Stages of change -Individual session -15-30 min -Face to face	Series 2.2: -If He Can, Why Not Me? -Video presentation -30-60 min -Face to face/online	Series 2.3: -Dos And Don'ts In Coping Strategies -Talk -30-60 min -Face to face/online	Series 2.4: -Live Your Life Purposely -Talk -30-60 min -Face to face/online	Series 2.5: -Stages of change -Individual session -15-30 min -Face to face	Series 2.6: -The Backbone Of My Life -Talk -30-60 min -Face to face/online	Series 2.7: -Who Is Who -30-60 min -Potluck & reward session -Face to face/online	Series 2.8: - I will not give up! -Talk -30-60 min -Face to face/online	Series 2.9: -Stages of change -Individual session -15-30 min -Face to face	Series 2.10: -Miracle In Intergeneration -Trip to kindergarten and play activity -30-60 min -Face to face/online	Series 2.11: -Goodbye Is Not The End -Potluck & reward session -30-60 min -Face to face/online		Booster Dose -Talk/trip to kindergarten/ play activity/ potluck/ reward session
Exercise			Series 3.1: - Multicomponent exercise -Combination of resistance, aerobic, balance and flexibility component -60 min/2 sessions/week -Face to face/online	Series 3.2: -Multicomponent exercise -Combination of resistance, aerobic, balance and flexibility component -60 min/2 sessions/week -Face to face/online	Series 3.3: -Multicomponent exercise -Combination of resistance, aerobic, balance and flexibility component -60 min/2 sessions/week -Face to face/online	Series 3.4: -Multicomponent exercise -Combination of resistance, aerobic, balance and flexibility component -60 min/2 sessions/week -Face to face/online	Series 3.5: -Multicomponent exercise -Combination of resistance, aerobic, balance and flexibility component -60 min/2 sessions/week -Face to face/online	Series 3.6: -Multicomponent exercise -Combination of resistance, aerobic, balance and flexibility component -60 min/2 sessions/week -Face to face/online	Series 3.7: -Multicomponent exercise -Combination of resistance, aerobic, balance and flexibility component -60 min/2 sessions/week -Face to face/online	Series 3.8: -Multicomponent exercise -Combination of resistance, aerobic, balance and flexibility component -60 min/2 sessions/week -Face to face/online	Series 3.9: -Multicomponent exercise -Combination of resistance, aerobic, balance and flexibility component -60 min/2 sessions/week -Face to face/online	Series 3.10: -Multicomponent exercise -Combination of resistance, aerobic, balance and flexibility component -60 min/2 sessions/week -Face to face/online	Booster Dose -Why exercise is important (Talk/ pamphlet) - Multicomponent exercise -30 min -face to face/online
Cognitive				Series 4.1: -Cognitive training briefing -Multidomain cognitive training (attention, memory, visuospatial reasoning, language, executive function, executive processing speed) -30-40 min/2 session/week -30-40 min/2 session/week -face to face/online	Series 4.2: -Multidomain cognitive training (attention, memory, visuospatial reasoning, language, executive function, executive processing speed) -30-40 min/2 session/week -face to face/online	Series 4.3: -Multidomain cognitive training (attention, memory, visuospatial reasoning, language, executive function, executive processing speed) -30-40 min/2 session/week -face to face/online	Series 4.4: -Multidomain cognitive training (attention, memory, visuospatial reasoning, language, executive function, executive processing speed) -30-40 min/2 session/week -face to face/online	Series 4.5: -Multidomain cognitive training (attention, memory, visuospatial reasoning, language, executive function, executive processing speed) -30-40 min/2 session/week -face to face/online	Series 4.6: -Multidomain cognitive training (attention, memory, visuospatial reasoning, language, executive function, executive processing speed) -30-40 min/2 session/week -face to face/online	Series 4.7: -Multidomain cognitive training (attention, memory, visuospatial reasoning, language, executive function, executive processing speed) -30-40 min/2 session/week -face to face/online	Series 4.8: -Multidomain cognitive training (attention, memory, visuospatial reasoning, language, executive function, executive processing speed) -30-40 min/2 session/week -face to face/online	Series 4.9: -Multidomain cognitive training (attention, memory, visuospatial reasoning, language, executive function, executive processing speed) -30-40 min/2 session/week -face to face/online	Booster Dose -Multidomain cognitive training -Cognitive activity in daily routine/talk -30 min -face to face/online
Vascular	Series 5.1: -Risk factor and goal setting -Individual counseling					Series 5.2: -Risk factor and goal setting -Individual counseling							Booster Dose -Healthy lifestyle (Talk/ pamphlet) -60 min



Figure 2 Personalization of the participant's diet with clinical dietician.



Figure 3 Individual counseling session using the Stages of Change model with clinical psychologist.

exercise, cognitive, vascular and multidomain intervention module, respectively. In terms of graphics, layout and typography for the multidomain intervention module, the CVI were 1.00 and 0.90, respectively. Other categories of evaluation such as content, motivating principles and literacy showed positive feedback from the expert panel members.



Figure 4 Multicomponent exercise session with physiotherapist.



Figure 5 Cognitive training games such as maze and spot the differences.



Figure 6 Individual counseling with physician.

Acceptance by Health and Social Care Providers, Older Adults with Cognitive Frailty and Caregivers

As shown in [Table 4](#), the average mean age of health and social care providers, older adults with CF and caregivers were 39.3 ± 10.5 , 66.0 ± 4.7 and 52.0 ± 17.8 years, respectively. Most of the health and social care providers (83.3%, $n = 15$) had tertiary education. Most of the older adults with CF (53.8%, $n = 7$) and caregivers (61.5%, $n = 8$) had secondary education. All the caregivers, 92% ($n = 12$) of older adults with CF and 83% ($n = 15$) of health and social care providers were satisfied with the overall content of the multidomain intervention module. A total of 55.6% ($n = 10$) of health and

Table 2 Sociodemographic Characteristics of Expert Panels for Content Validity [Presented as Mean \pm SD or n (%)]

Parameters	Men (n=6)	Women (n=7)	Total (n=13)
Age (years), mean \pm SD	46.8 \pm 9.8	49.0 \pm 7.6	48.0 \pm 8.4
Ethnicity, n (%)			
Malay	5 (83.3)	6 (85.7)	11 (84.6)
Chinese	1 (16.7)	1 (14.3)	2 (18.4)
Job categories, n (%)			
Physician	2 (33.3)	2 (28.6)	4 (30.8)
Academician	1 (16.7)	2 (28.6)	3 (23.1)
Healthcare professional	3 (50.0)	3 (42.9)	6 (46.2)
Workplace, n (%)			
Ministry of Health	5 (83.3)	5 (71.4)	10 (76.9)
Higher education institution	1 (16.7)	2 (28.6)	3 (23.1)

Table 3 Content Validity Index for the Multidomain Intervention Module by Expert Panel Members

Intervention Modules	Nutrition (n=9)	Psychosocial (n=6)	Exercise (n=9)	Cognitive (n=9)	Vascular (n=6)	Multidomain (n=6)
Categories	CVI ^a Interpretation ^b	CVI ^a Interpretation ^b	CVI ^a Interpretation ^b	CVI ^a Interpretation ^b	CVI ^a Interpretation ^b	CVI ^a Interpretation ^b
Content	0.81 Appropriate	0.79 Needs Revision	0.83 Appropriate	0.84 Appropriate	0.79 Needs Revision	0.79 Needs Revision
Motivating Principles	0.84 Appropriate	0.83 Appropriate	0.56 Needs Revision	0.89 Appropriate	0.83 Appropriate	0.83 Appropriate
Literacy	0.78 Needs Revision	0.71 Needs Revision	0.64 Needs Revision	0.81 Appropriate	0.71 Needs Revision	0.71 Needs Revision
Layout and Typography	0.82 Appropriate	0.90 Appropriate	0.89 Appropriate	0.89 Appropriate	0.90 Appropriate	0.90 Appropriate
Graphic	0.89 Appropriate	1.00 Appropriate	0.96 Appropriate	0.93 Appropriate	1.00 Appropriate	1.00 Appropriate
Overall	0.82 Appropriate	0.83 Appropriate	0.80 Appropriate	0.86 Appropriate	0.83 Appropriate	0.83 Appropriate

Notes: ^athe number of expert panel members who rated the item as relevant (rating 3 or 4) divided by the total number of expert panel members (n=6); ^bCVI was higher than 0.79, the item is appropriate. If between 0.70 and 0.79, the item would need revision. If less than 0.70, the item would be eliminated.

Abbreviation: CVI, Content Validity Index.

social care providers were satisfied with the terminologies used in the module in comparison to 69.2% (n = 9) of older people and 84.6% (n = 11) of the caregivers. Overall, 76.9% (n = 10) of the caregivers approved the length of sentences included in the module. All the caregivers were satisfied with the font size used in the module; however, 7.7% (n = 1) of

Table 4 Sociodemographic Characteristics of Health and Social Care Providers, Older Adults with Cognitive Frailty and Caregivers for Acceptance Evaluation [Presented as Mean ± SD or n (%)]

Parameters	Health and social care providers (n=18)	Older adults with cognitive frailty (n=13)	Caregivers (n=13)
Age (years), mean ± SD	39.3 ± 10.5	66.0 ± 4.7	52.0 ± 17.8
Gender, n (%)			
Men	4 (22.2)	5 (38.5)	1 (8.0)
Women	14 (77.8)	8 (61.5)	12 (92.0)
Ethnicity, n (%)			
Malay	16 (88.9)	8 (61.5)	9 (69.2)
Chinese	2 (11.1)	2 (15.4)	1 (7.7)
Indian	0 (0.0)	3 (23.1)	3 (23.1)
Employment status, n (%)			
Not working/ housewife/ retired	0 (0.0)	12 (92.3)	9 (69.2)
Healthcare provider	14 (77.8)	0 (0.0)	0 (0.0)
Social care provider	4 (22.2)	0 (0.0)	0 (0.0)
Private sector	0 (0.0)	1 (7.7)	4 (30.8)
Education level, n (%)			
No formal education	0 (0.0)	1 (7.7)	0 (0.0)
Primary education	0 (0.0)	3 (23.1)	2 (15.4)
Secondary education	3 (16.7)	7 (53.8)	8 (61.5)
College/University	15 (83.3)	2 (15.4)	3 (23.1)

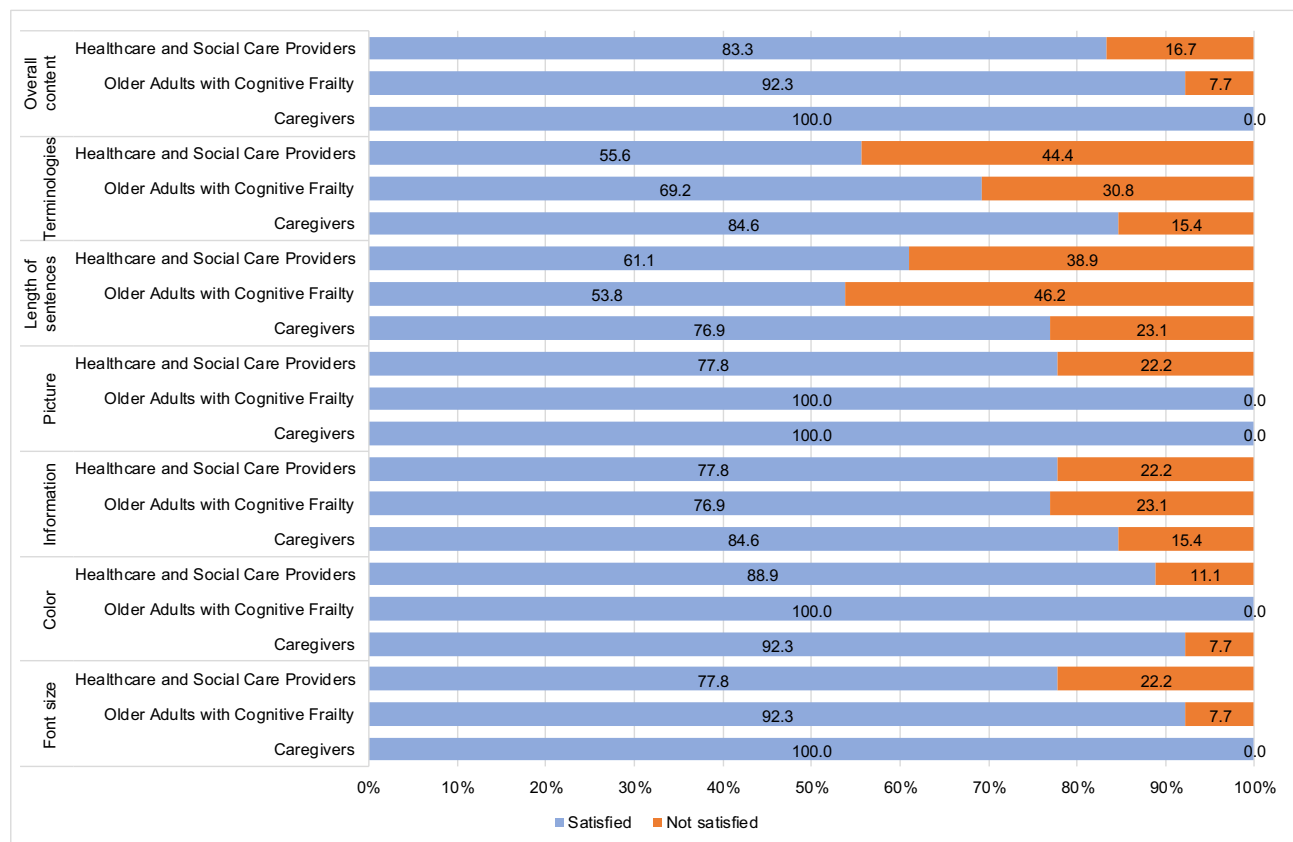


Figure 7 Satisfaction with the multidomain intervention module by health and social care providers, older adults with cognitive frailty and caregivers.

the older adults with CF had expressed their disapproval. Majority of the older adults with CF and caregivers who participated in this study approved the pictures incorporated in the module (Figure 7).

Discussion

In the present study, we successfully developed a validated multidomain intervention module for the reversal of cognitive frailty among older adults. The module was also well accepted. Due to the COVID-19 pandemic, the intervention was administered using a hybrid approach whereby both face-to-face and online sessions were employed. Face-to-face counseling was conducted to address the specific needs of older adults in individual and personalized nutrition, psychosocial support, exercise and cardiovascular health. Personalized nutrition through face-to-face dietary counseling nutrition interventions has been found to be effective in facilitating dietary changes.²⁵ Meanwhile, interactive methods such as online games, video presentation, gardening, cooking demonstrations, and visit to a kindergarten were utilized to conduct group sessions. Interactive cognitive-motor interventions have been found to improve physical and cognitive fall risk factors in older people.²⁶ The module was also equipped with photos to facilitate the participants in understanding health messages as this approach has been reported to be effective.²⁷ Health maintenance activities were incorporated to reinforce the health messages delivered, hence necessitating the repetition of information for optimal learning in older adults.²⁸

The determination of relevance and quality of an educational material is crucial.²⁹ The overall CVI for the current multidomain intervention module was 0.83, thus, indicating good content validity. The same approach was used in another study to validate educational materials by using CVI.²⁴ However, content validation of this module required some corrections, including revisions to the content, language, and activity examples. After discussions with the expert panels in this study, we had improved the content of the module, rephrased medical jargon with layman's terms and incorporated more activities that were more relatable to real life. The contents that had been improved were "maintain

body weight and muscle strength”, “social activities” such as organizing a trip and potluck session with the participants and “benefits of exercise”. The process of adapting educational materials to the suggestions and evaluation of experts is an essential step to ensure that the module is more scientifically rigorous and effective for health education activities.²⁹ Besides that, more activities related to real life were incorporated in the module such as cooking, gardening, potluck, problem-solving, multitasking, chair-based activities and obstacle walking. Activities such as cooking, exercise, and problem solving related to real life have been shown to be suitable tools in educating older people about lifestyle modification strategies that can slow down cognitive impairment.³⁰

In view of the evaluation of acceptance of the content module, majority of health and social care providers, older adults with CF, and caregivers in this study expressed overall satisfaction. Similar findings were reported in our team’s earlier study.¹⁸ The acceptance test enables the targeted population to provide their input.³¹ This step assists in the improvement of educational materials that can accommodate their needs. In this study, the participants suggested maximizing font size, using simpler words, and incorporating more visuals to replace words. Furthermore, in response to participants’ input, the initial font size 10 of the module content was increased to size 20. Previous studies have highlighted the preference of older adults for larger font sizes in educational materials and M-Health³² due to the high prevalence of eyesight problems. In terms of the language used, the module initially contained scientific terms, which were subsequently replaced with simpler and accessible terms. Furthermore, suggestions by participants to incorporate more pictures aligned with the findings of previous studies,³³ which reported that the use of pictures can increase attention and recall of health-related educational content.

The strength of this study is the appropriate process to develop the intervention module.³⁴ Nevertheless, this study has a few limitations, including the potential lack of representativeness of the samples with participants consisting of older adults and caregivers from the Klang Valley area. Their perspectives may not represent the views of older adults from other regions in Malaysia. The multidomain intervention module was developed in one language, ie, Malay which is the national language. Thus, future study should consider translating it to other languages such as English and Mandarin to increase its outreach among other ethnic groups in Malaysia.

Conclusion

In conclusion, the contents of the newly developed multidomain intervention were successfully validated among healthcare experts and well accepted by all the older adults with cognitive frailty, and caregivers, particularly for picture and color used in the module. The multidomain intervention module is ready to be tested for its effectiveness. With further testing, this comprehensive module has the potential to be used as a tool kit in efforts to prevent cognitive frailty among older adults, particularly from those in low middle income countries.

Abbreviations

CDR, Clinical Dementia Rating Scale; CF, Cognitive Frailty; CVI, Content Validity Index; FINGER, Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability; iAGELESS, Multidomain Intervention Module to Reverse Cognitive Frailty Among Older Adults; MCI, Mild cognitive impairment; MMSE, Mini-Mental State Examination; TEMPtED, Tool to Evaluate Materials Used in Patient Education; WE-RISE, Warga Emas-Resilient mInd and muScle Exercise.

Data Sharing Statement

Data available on request from the authors.

Ethics Approval and Informed Consent

The study was reviewed and approved by Research Ethics Committee of Universiti Kebangsaan Malaysia (UKM PPI/111/8/JEP-2020-347). The participants provided their written informed consent to participate in this study.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare no conflicts of interest in this work.

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