Validation of “Successful Aging Factors Enhancement” (S.A.F.E.™) for Dementia Prevention

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ABSTRACT

Objectives: This study aims to develop and validate a short and simple educational tool on dementia prevention. Method: A 29-item tool “Successful Aging Factors Enhancement” (SAFE) is constructed. Part One (7-items) examines age, family and individual non-modifiable risk factors in dementia. Part Two (22-items) consists of four dimensions, including modifiable risk factors of Alzheimer’s disease (8-items); lifestyle was measured by validated tool, Positive Ageing Index (4-items); mood was measured by WHO Five Well-being Index (5-items); and cognitive health was measured by self-constructed (5-items). Life Satisfaction Scale (5-items) was used to measure concurrent validity [21]. Face validity was established by a panel of five multi-disciplinary healthcare professionals. Data was collected from 116 respondents aged over 60 through convenient sampling. SPSS (v22) was used for data analysis. Results: Factor analyses revealed an eight-factor model. Cronbach’s Alpha of the whole tool was 0.846, suggesting good internal consistency. Cronbach Alpha for the first five factors were as follows, namely, (1) Good Mood, Good Sleep (8 items, 0.870); (2) Good Moves, Good Brain (9-items, 0.857); (3) Good Physical Health (5-items, 0.594); (4) Good Habits (2 items, 0.313) and (5) Aging Diseases (2 items, 0.299). The last three factors had one single-item, namely: (6) family history of dementia/Alzheimer/Down syndrome; (7) head-injury; (8) education below secondary. Concurrent validity was established through Pearson’s correlation among eight factors and Life Satisfaction Scale. Conclusion: SAFE is a simple and reliable tool to educate older adults on dementia prevention and on successful aging.

Keywords: Dementia prevention, Successful Aging.

1. Introduction

In Hong Kong, for every 10 older adults over the age of 60 years, there is one at risk of cognitive disorders; and for people over the age of 85 years, there will be one in every three people suffering from this disease [53]. The number of people aged 60 or above with dementia is projected to increase by 222% from 103,433 in 2009 to 332,688 in 2039 [53] Chau and colleagues pointed out the lack of health knowledge among older adults in Hong Kong [11]. Woo and Wong also pointed out the benefits of mid-life risk factor reduction on the prevalence of late-life dementia [49]. Knowledge of health risks changes health behavior [6]. The Health Belief Model (HBM) [24,41] suggested an association between an individual’s estimates of personal risks as well as perceived severity of illness and the likelihood of being able to reduce that threat through personal action [10]. Focusing on risk of Alzheimer’s disease, instead of diagnosis, provides a more realistic target for preventive strategies [3]. Preference for prevention is stronger with increased perceived risk [16] and “Prevention through delay” by working on the modifiable risk factors is the key [44].

There are different risk factors identified in literature. Non-modifiable risk factors in dementia include age, family and individual health factors. On the other hand, there is evidence on modifiable risk factors in dementia [8], including vascular health, lifestyle, mood, cognitive health and education. As older adults are most feared of dementia [18], it is most important that they understand something can be done to prevent dementia [51].

2. Method

2.1 Study Design

Ethical approval for this study was obtained from a local university in Hong Kong. SAFE is validated using data collected from 116 older respondents. In order to participate in the study, participants were required to be at least 60 years old, and could read and write and convenient sampling was used. All participants provided written consent before participation in this study.
2.2 Contents of This Tool

A 29-item tool “Successful Aging Factors Enhancement” (SAFE) is constructed.

Part One (7-items) examines age, family and individual non-modifiable risk factors in dementia. The seven non-modifiable risk factors, including age; one or more family member had dementia/Alzheimer’s disease/Down syndrome [44]; self or family member diagnosed with Parkinson’s disease [17,40]; self being diagnosed of cardiovascular disease/stroke; cancer [22]; suffered one-time head injury that resulted in loss of consciousness or suffered multiple head injuries but no loss of consciousness [44]; age prevalence [2,53] and familial and individual medical history [28]. The genetic apolipoprotein E (APO-E4) gene was still uncontrollable at the time of this research [32]. Genotype was only available at clinical settings and the general population of older adults was unaware. As such, this item was not included.

Part Two (22-items) consists of four dimensions, including modifiable risk factors of Alzheimer’s disease (8-items); lifestyle was measured by validated tool, Positive Ageing Index (4-items); mood was measured by WHO Five Well-being Index (5-items); and cognitive health was measured by self-constructed (5-items).

The first dimension included modifiable risk factors of Alzheimer’s disease. Among the seven modifiable risk factors [8], the seventh and the last factor is the lack of cognitive activity or low educational attainment. For the easier understanding of this tool, we have separated the last factor into two items. As such, there were eight-items altogether, including: diabetes; hypertension; obesity; depression; lack of physical activity (exercising for at least one hour weekly on average); smoking; the lack of cognitive activity; and finally, educational level below secondary school level.

The second dimension was on lifestyle and was selected from a validated tool, Positive Ageing Index [35], including the present health condition, coping with stress, sleeping well and cognitive engagement. These items were selected from ‘Positive Ageing Index’ [13], which was constructed and validated by one of the authors and her associates.

The third dimension was adopted from WHO-Five Well-being Index [1] and consisted of five items, measuring mood and depression. This is adopted from ‘WHO-Five Well Being Index’ [1]. Unlike the Geriatric Depression Scale (GDS) [52], these five positively worded items do not directly mention the symptoms of depression and measure good mood instead. As such, this tool was chosen as it might induce less fear for the older adults. The five items included feeling cheerful and in good spirits; calm and relaxed; active and vigorous; waking up fresh and rested; and finally, life has been filled with interesting things.

The fourth and last dimension consisted of five items, measuring cognitive health [19]. This was self-constructed by the research team and consisted of the following: participation in cognitively stimulation activities such as reading newspapers, playing games like checkers, chess, cards or crossword puzzles; using effective relaxation techniques to handle negative emotions; doing vigorous leisure-time physical activity of at least twice a week, each lasting 20-30 minutes; using of relaxation techniques to improve sleep; actively avoiding hypertension, hyperglycemia, hypercholesterolemia and being overweight.

Five multi-disciplinary healthcare professionals including a ger-o-psychologist, a geri-psychiatrist, a geriatrician, a social gerontologist and a nurse consultant were invited to form an expert panel to comment on SAFE, including its content, presentation, wordings and Cantonese translation. As a result, slight amendments were made on use of words and presentation to establish its face and content validity.

2.3 Other Parts of the Questionnaire

The questionnaire also included a Five-item Life Satisfaction Scale [21] which was adopted to establish the convergent validity of SAFE. It measures agreement to an ideal life, excellent life conditions, life satisfaction, gotten the important things in life and if one could live over again, one would change almost nothing. Finally, data on the personal characteristics of the respondents were gathered including age, gender, marital status, education level, and whether or not one has previous contact or experience with a person with dementia.

2.4 Data Analysis

SPSS version 22 was used in the data analysis. All items except for “Modifiable Risk Factors” used a 5-point Likert scale. The eight modifiable risk factors used a yes/no answer.

2.5 Participants (N=110)

Total number of participants was 116 older adults (23% male, 77% Female). Fifty-nine percent was married, 13% divorced, 16% widowed, 2% separated and 10% were never married. A total of 41% had previous contact or experience with persons with dementia while 9% were caregivers. With respect to risks for dementia, the mean age was 65 years old (SD = 10.43) with the majority (60%) falling between age 60 to 69. A total of 16% had a
family history of dementia/Alzheimer’s disease diagnosis or down syndrome; 6% had family or own history of Parkinson’s disease; 19% had heart disease diagnosis or stroke; 16% was diagnosed with cancer; 8% suffered one-time head injury that resulted in loss of consciousness or suffered multiple head injuries but no loss of consciousness; 12% had alcohol or drug dependence in the past or present. With respect to modifiable risk factors, 14% had diabetes; 35% had hypertension; 34% was obese; 19% had depressive symptoms; 20% lacked exercise; 8% smoked or had not stopped smoking for more than 5 years; 20% lacked cognitive activity and 30% had an educational level below secondary school. After deleting the 6 outliers, the total number of participants became 110.

3. Results

3.1 Psychometric properties of SAFE

3.1.1 Factor Structure of SAFE

Factor structure of the 29-item SAFE was extracted by the use of Principle Components Analysis. Rotation method used was Varimax with Kaiser Normalization. The Rotated Component Matrix revealed an Eight-factor structure with factor loadings presented in Table 1.

The first factor consisted of 8 items with factor loadings will be presented in parentheses. The first factor included feeling cheerful and in good spirits (0.844), calm and relaxed (0.833), active and vigorous (0.804), fresh and rested (0.776), daily life filled with things that interest me (0.734), when confronted with stress, being able to cope and recover (0.631), having depressive symptoms (0.581) and sleeping well recently (0.542). With all items covering mood and sleep, Factor One is being named “Good Mood, Good Sleep”.

The second factor consisted of 9 items in cognitive lifestyle, including doing leisure-time physical activity every two days, each lasting 45 minutes (0.712); actively avoiding hypertension, hyperglycemia, hypercholesteremia and being overweight (0.694); using or relaxation techniques to improve sleep (0.678); participated in activities that contributed to community and society (0.648); using effective relaxation techniques to handle negative emotions (0.647); participating in cognitively stimulating activities (e.g. reading newspapers, playing games like checkers, chess, cards or crossword puzzles) (0.581); physical activities (exercising for at least one hour weekly on average) (0.483) and finally, overall present health (0.475). Factor Two is being named “Good Moves, Good Brain”.

The third factor consisted of 5 items in age and physical health, including hypertension (0.682); heart disease (0.566); age (0.564); diabetes (0.505); obesity (for aged 40-60, BMI exceeding 30/waist circumference exceeding 40” (male) and 35” (female) (0.485). Factor Three is being named “Good Physical Health”.

The fourth factor consisted of 2 items in lifestyle habits, including no smoking (for having stopped smoking for over 5 years) (0.759) and no dependence on drug or alcohol (in the past and present) (0.577). Factor Four is being named “Good Habits”.

The fifth factor consisted of 2 items of aging diseases, including self being diagnosed of cancer (0.750) and immediate family member or self being diagnosed of Parkinson’s disease (0.643). Factor Five is being named “Aging Diseases”.

The last three factors belonged to the non-modifiable risks in dementia and each factor had one single-item only. Factor Six: family history of dementia/Alzheimer/Down syndrome (0.864); Factor Seven: head-injury (0.755) and Factor Eight: education below secondary (0.683).

Items loading on the eight factors accounted for 65.84% of the variance. Factor 1: Good Mood included 8 items, accounted for 28.29% of the variance. Factor 2: Good Moves, Good Brain included 9 items, accounted for 8.94% of the variance. Factor 3: Good Physical Health included 5 items, accounted for 6.05% of the variance. Factor 4: Good Habits included 2 items, accounted for 5.32% of the variance. Factor 5: Aging Diseases included 2 items, accounted for 4.98% of the variance. Factor 6: family history of dementia/Alzheimer/Down syndrome accounted for 4.33%; (7) head-injury at 4.27% and (8) education below secondary at 3.65%.

3.1.2 Concurrent Validity

Concurrent validity was established in two ways. The first was through the use of Pearson’s correlation (r) among the different factors. Very significant correlation was found between Good Mood, Good Sleep and Life Satisfaction Scale (LSS) (r = 0.699, p < .01); Good Mood, Good Sleep and Good Moves, Good Brain (r = 0.603, p < .01); Good Moves, Good Brain and LSS (r = 0.541, p < .01); Good Moves, Good Brain and Good Physical Health (r = 0.487, p < .01) as well as Good Mood, Good Sleep and Good Physical Health (r = 0.285, p < .01).

In addition, significant correlations was found between Good Mood, Good Sleep and Good Habits (r = 0.237, p < 0.05); Good Moves, Good Brain and Good Habits (r = 0.224, p < 0.05); Good Moves, Good Brain and Education below Secondary (r = 0.215, p < 0.05) as well as Good Physical Health and LSS (r=0.206, p < 0.05).
At the same time, SAFE’s concurrent validity was established through the correlation of each of the eight factors and the overall LSS. Correlation with LSS was found to be very significant (2-tailed) between LSS and Good Mood, Good Sleep \( (r = 0.699, p < .001) \), followed by LSS and Good Moves, Good Brain \( (r = 0.541, p < .001) \) as well as LSS and Good Physical Health \( (r = 0.206, p < .001) \).

### 3.1.3 Internal Consistency

Cronbach’s Alpha of the first five factors were as follows: Factor 1: Good Mood, Good Brain (8 items, \( \alpha = 0.870 \)); Factor 2: Good Moves, Good Brain (9 items, \( \alpha = 0.857 \)); Factor 3: Good Physical Health (3 items, \( \alpha = 0.594 \)); Factor 4: Good Habits (2 items, \( \alpha = 0.313 \)) and Factor 5: Aging Disease (2 items, \( \alpha = 0.299 \)). Cronbach’s Alpha was not available for Factor 6: Head Injury; Factor 7: Education below Secondary and Factor 8: Family Dementia, with one item in each of these three factors. When all 8 factors were combined (29 items), Cronbach’s Alpha was 0.846.

### 4. Discussion

The aim of this study was to develop and validate a simple, valid and reliable tool to enhance the health knowledge of older adults on dementia prevention. In general, SAFE showed satisfactory psychometric properties with regard to reliability and validity.

In addition, SAFE is also a useful tool to draw the participants’ attention to the different risk factors in dementia. By introducing Part One (7-items) examines age, family and individual non-modifiable risk factors in dementia, older adults will find out about their individual risk in dementia. On the other hand, Part Two (22-items) introduced the modifiable risk factors as well as actions recommended in the different subscales of Good Mood, Good Sleep; Good Moves, Good Brain; Good Physical Health and Good Habits. As such, SAFE also serves important educational function and gives the message that if the participants take action to reduce their modifiable risk factors, they can lower their own risk for dementia; thus inspiring hope for older adults. In addition, participants are also educated about the components of well-being, which offer cues to manage their emotions in a positive way and will help older adults identify their own depressive symptoms, if any.

SAFE, a simple tool with a total of 29 questions only, can generally be completed around ten minutes. In answering the question items, older adults will increase their knowledge in their own risk in dementia and in turn, they become motivated to take action for their better well-being (WHO, 1998). With SAFE, older adults become aware of their own personal lifestyle, mood, cognitive activities as well as the modifiable risk factors in dementia. As such, SAFE helps older adults prevent dementia, enhance successful aging and ultimately, increase their overall life satisfaction.

Compared to traditional cognitive assessments which are more expensive, time-consuming and required trained raters [34], SAFE is a simple and easy-to-understand self-assessment. Earlier study on successful aging in Hong Kong [14] covered different dimensions but not on preventable aspects in dementia. When compared to the Global Measure of Successful Aging for Singaporeans [23] which consists of face-to-face interviews; the telematics tool [32] as well as the 25-minute telephone interview [27], SAFE requires less than ten minutes to fill in and is much more cost effective.

### 4.1 Limitations and future research

This study, however, has limitations. The assumption that every older adult is ready to be alerted on their own risks in dementia may not be absolutely true. Despite the careful design of SAFE in terms of offering hope, covering cues in modifiable risk factors, the fear of possible diagnosis in dementia is still evidenced [18]. For those older adults having subjective memory complaints or simply wanting to engage in a healthier lifestyle, psycho-education programs promoting Good Mood, Good Sleep, Good Moves, Good Brain, Good Physical Health and Good Habits could be in place as a follow up. Moreover, further follow-up guidelines, such as professional assessments for possible diagnosis, professional consultations on advance care planning or counseling services for possible anxiety and depression cases should be made available, in case participants want to follow up on their individual situation after taking SAFE. Second, given the small sample size of this study and the majority (60%) of our participants’ age falling around 70, the awareness of memory complaints or the risks of dementia may differ with those of other age-groups. As such, further studies using SAFE with different age-groups may shed light on dementia literacy for older adults in general.

Finally, one limitation relates to the language used in this study, which is Cantonese, a common dialect used in the southern part of China. Future study is recommended to validate SAFE with the use of different languages and dialects, so that it can be used with older people of different cultural backgrounds.
5. Conclusion

SAFE is found to be a short, simple, reliable and valid health literacy tool for a general population of older adults on dementia prevention. Drawing reference from the Health Belief Model (HBM) [24,41], SAFE enables the respondents to be aware of their personal risk for dementia by the three factors: Head Injury, Education below Secondary and Aging Diseases. On the other hand, the other five factors namely Good Mood, Good Sleep; Good Moves; Good Brain; Good Physical Health and Good Habits serve to motivate preventive action.

SAFE also draws the older people’s attention on the modifiable risk factors and healthy life style to achieve successful cognitive health, thereby inspiring them to actively engage in reducing risk factors for dementia in late life, thus contributing to the preventable aspect of dementia. This tool will also help alert those with subjective memory complaints who may be experiencing Subjective Cognitive Impairment (SCI) to prevent and/or delay dementia through enhancing their successful aging factors.

Barnes & Yaffe [8] projected that by delaying symptoms in Alzheimer’s disease onset by as little as one year, this could potentially lower disease prevalence by more than 9 million cases over the next 40 years. Finally, modifications in modifiable risk factors in dementia work best at midlife [49]. As such, SAFE should also be promoted to middle-aged people as a form of preventive health education.

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7. References


