ORIGINAL RESEARCH

The Pictorial Fit-Frail Scale: Developing a Visual Scale to Assess Frailty

Olga Theou, PhD[1,2,3], Melissa Andrew, MD[1,2], Sally Suriani Ahip, MMed[4], Emma Squires, BA[2], Lisa McGarrigle, PhD[1], Joanna M. Blodgett, MSc[5], Judah Goldstein, PhD[6,7], Kathryn Hominick, MSW[2], Judith Godin, PhD[2], Glen Hougan, MDes[8], Joshua J. Armstrong, PhD[9], Lindsay Wallace, MSc[1], Shariff Ghazali Sazlina, PhD[10], Paige Moorhouse, MD[1,2], Sherri Fay, MA[2], Renuka Visvanathan, PhD[3,11], Kenneth Rockwood, MD[1,2]

[1]Geriatric Medicine, Dalhousie University, Halifax, NS, Canada; [2]Geriatric Medicine, Nova Scotia Health Authority, NS, Canada; [3]National Health and Medical Research Council Centre of Research Excellence in Frailty and Healthy Ageing, University of Adelaide, South Australia; [4]Sarawak State Health Department, Ministry of Health, Malaysia; [5]MRC Unit for Lifelong Health and Ageing at UCL, London, UK; [6]Emergency Health Services Nova Scotia, Halifax, NS, Canada; [7]Department of Emergency Medicine, Division of EMS, Halifax, NS, Canada; [8]Nova Scotia College of Art and Design University, Halifax, NS, Canada; [9]Department of Health Sciences, Lakehead University, Thunder Bay, ON, Canada; [10]Department of Family Medicine, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Selangor, Malaysia; [11]Adelaide Geriatrics Training and Research with Aged Care (GTRAC) Centre, Adelaide Medical School, Faculty of Health and Medical Sciences, University of Adelaide, Adelaide, South Australia

DOI:https://doi.org/10.5770/cgj.22.357

ABSTRACT

Background

Standardized frailty assessments are needed for early identification and treatment. We aimed to develop a frailty scale using visual images, the Pictorial Fit-Frail Scale (PFFS), and to examine its feasibility and content validity.

Methods

In Phase 1, a multidisciplinary team identified domains for measurement, operationalized impairment levels, and reviewed visual languages for the scale. In Phase 2, feedback was sought from health professionals and the general public. In Phase 3, 366 participants completed preliminary testing on the revised draft, including 162 UK paramedics, and rated the scale on feasibility and usability. In Phase 4, following translation into Malay, the final prototype was tested in 95 participants in Peninsular Malaysia and Borneo.

Results

The final scale incorporated 14 domains, each conceptualized with 3–6 response levels. All domains were rated as "understood well" by most participants (range 64–94%). Percentage agreement with positive statements regarding appearance, feasibility, and usefulness ranged from 66% to 95%. Overall feedback from health-care professionals supported its content validity.

Conclusions

The PFFS is comprehensive, feasible, and appears generalizable across countries, and has face and content validity. Investigation into the reliability and predictive validity of the scale is currently underway.

Key words: frailty, assessment, feasibility, content validity, Pictorial Fit-Frail Scale

INTRODUCTION

Although many adults have good health in older age, many are frail. In Canada, 24% of people aged 65+ and more than 50% of those aged 85+ are classified as frail.(1) Frailty is defined as a multiply determined state of increased vulnerability to adverse outcomes among people of the same chronological age.(2) Frail people have multiple, interacting medical and social problems, which reduce their ability to recover from physiological and psychological stressors (e.g., falls). Frailty affects the quantity and quality of life of older adults, as well as their health-care utilization and ability to function independently.(3-8)

How to achieve consensus regarding the best measure of frailty, and whether the same tools should be used across

settings, are controversial topics.[9] A 2018 scoping review reported 89 different measures were used to identify frailty; at the same time, most studies of frailty in that setting used no definition at all.[10] The controversy reflects in part that most existing scales have important limitations, so that many clinicians are not persuaded of their measurement properties especially including their feasibility in routine care. Some scales (e.g., frailty phenotype, Edmonton Frail Scale) measure physical performance, such as timed walks or grip strength, in ways that are impractical for people who are severely frail. Others (e.g., frailty phenotype, FRAIL scale) identify only a small number of symptoms, overlooking important information from patients and caregivers. Many scales (e.g., Tilburg and Groningen Frailty Indicators) ask patients to verbally report their problems and limitations, which is not feasible for people with communication issues, including dementia, or people with limited health literacy or language barriers. Visual scales provide an alternative to the language-based tools and have been widely used in the medical field, especially for the assessment of pain levels.[11] Finally, most scales evaluate only the patient's or clinician's perspective. A patient's perspective can be at odds with that of their caregiver and/or health professional; a well-documented issue when it comes to rating quality of life[12-14] and care.[15] Therefore, ideally all perspectives should be considered in order to empower older patients to actively participate in their own care. Furthermore, due to the limited availability of specialist physicians in geriatric medicine[16] (304 in Canada in 2018[17]), there is a need for a frailty assessment tool that does not require geriatric training in its administration.

In response to these challenges, our group undertook the development of a frailty scale based on visual images: the Pictorial Fit-Frail Scale (PFFS). The aim was to develop a tool that would be simple to use, easy to administer, and sensitive to cultural differences in a way that is generalizable across countries and education levels (i.e., health literacy). We also aimed to examine the feasibility and the face and content validity of the tool as part of the development process.

METHODS

A multidisciplinary group, led by the Geriatric Medicine Research Unit team at Dalhousie University, was assembled to create a visual scale to measure frailty. The team comprised researchers, physicians, a social worker, an occupational therapist, knowledge translation specialists, a paramedic, administrators, and a graphic designer. Development of the scale was a four-phase iterative process whereby the scale was continually adjusted, based on expert and stakeholder feedback.

Phase 1

The initial phase was focused on: (i) selecting domains commonly used within frailty and comprehensive geriatric assessments to render visually; (ii) describing commonly recognized abilities/impairments within each domain to identify distinct potential levels; and (ii) choosing a visual language (ranging from abstract to representational) that would convey meaning as clearly and universally as possible. The anticipated result of the first phase was the creation of 3–7 images that represented progressive levels of impairment for each candidate domain.

Phase 2

The second phase was designed to test whether the images were interpreted by others as depicting the intended impairments in the selected domains, to examine face and content validity, and to create a first draft of the scale. We conducted interviews with 15 health-care professionals, 6 patients of specialized geriatric services, and 4 caregivers, as well as 11 participants from the general public (Appendix A). Participants were recruited through e-mail and geriatric medicine clinics, and approached in public areas (e.g., library), and asked to complete three tasks. Task 2.1 was designed to determine whether a hierarchy of impairment was empirically evident for the images within each domain. Images for a single domain were placed in random order on a table and participants were asked to organize the images in a straight line starting with the image that depicted no or least impairment and ending with the image that depicted the most impairment (Figure 1). This task was repeated for each domain. Task 2.2 was designed to determine whether people could readily associate their own health status, or that of someone else, with the images from each domain. Participants aged 65+ were asked to choose a picture from each domain that most closely matched their usual state and to explain their choice. Health-care professionals and those aged under 65 years were asked to think of someone aged 65+ whose health they knew well and answer accordingly. Participants were invited to share what they thought other images represented. For Task 2.3, participants were asked open-ended questions about their level of understanding of the images. To examine content validity, health-care professionals were asked if the scale would be

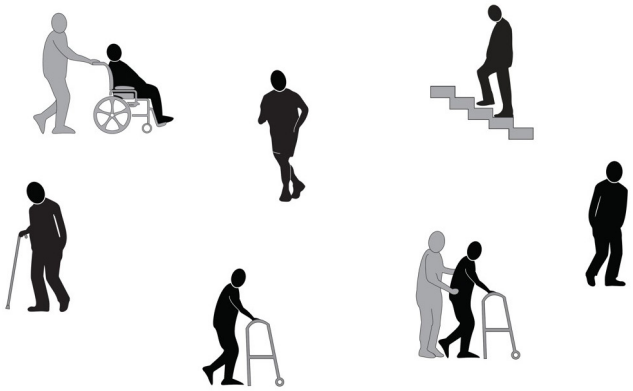


FIGURE 1. Phase 2: Mobility images given to participants in random order who ranked them from no or least impairment to worsening impairment

helpful in their practice with regard to frailty assessment, whether the scale adequately captured frailty, and whether they believed that any domains or levels were missing. We also asked for any additional feedback that was not captured in the previous tasks.

Phase 3

The goal of the third phase was to receive feedback on the first draft of the PFFS and produce a final prototype. We recruited 204 participants through hospital clinics and academic/research conferences and meetings. We also sent out online surveys to paramedics from the North West Ambulance Service in the United Kingdom (n = 162). The scale was continually adjusted based on feedback, with 21 patients and caregivers receiving the final prototype of the scale.

Health-care professionals were asked to complete 5 tasks:

3.1 Complete the PFFS based on the health of someone they know well and time it.
3.2 Record the age, gender, and rate the health of that person.
3.3 Complete the PFFS based on a medical case study provided.
3.4 Rate their understanding for each domain.
3.5 Complete a questionnaire providing overall feedback about ease of use and the feasibility of PFFS in practice (Table A1)

Patients and caregivers were asked to complete all tasks (except task 3.3) for either themselves or based on the health of the person they were caring for. Research assistants recorded completion time for patients and caregivers.

Phase 4

The goal of the fourth phase was to test the generalizability of the tool by translating the final prototype of the scale into Malay, the official language of Malaysia. The aim was to investigate whether the tool could be clearly understood when piloted in a sample of patients, caregivers, and health-care professionals of varying skill sets including doctors, nurses, and health-care assistants (medical attendants with secondary school qualifications and basic clinical training). The translation process included forward and backward translations by two bilingual translators, from the original English version to Malay; a Malay version of the PFFS was formed upon expert reviewers' consensus. During translation, discrepancies were discussed and resolved after critical consideration of the semantic, conceptual, and experiential equivalence of each domain of the PFFS in the Malaysian setting. A consensus resulting in the PFFS Malay version was reached after assessing for translation accuracy, comprehensibility of the instructions, and cultural relevance.

Professionals from four public primary health-care clinics in Peninsular Malaysia and Borneo tested the tool. Patients who had come with their caregivers for routine clinical care were invited to participate. Patient participants were asked to fill out the PFFS themselves, and their caregivers were asked to fill out the PFFS based on the health of the patient. A group of health-care professionals were given a case scenario to complete the PFFS. Using a survey, all participants rated their understanding of the instructions and images. The level of assistance required by the participants was determined by the researcher and categorized into "no assistance" (able to complete the scale independently), "minimal assistance" (required some clarification), and "significant assistance" (researcher had to administer the scale).

The development protocol was reviewed and approved by the Nova Scotia Health Authority Research Ethics Board. Phase 4 of the study was approved by the National Medical Research Registry and the Ethics and Research Committee of the National Institutes of Health Malaysia. All participants provided written informed consent.

PFFS Scoring

Both raw and standardized PFFS scores were calculated. Raw PFFS scores were calculated by summing the scores for each domain; the level representing least or no impairment (level one) for each domain was scored 0, the next level as 1, etc; the final summed score could theoretically range from 0 (no frailty; very fit) to 43 (severely frail) for the final prototype.

A standardized Frailty Index (FI)[18] was constructed by dividing the raw PFFS score by the maximum possible score for that version of the scale. Higher scores indicated increased frailty. Raw and FI scores were not calculated when more than 20% of the levels were missing.

RESULTS

Phase 1

After reviewing frailty scales and the current evidence about frailty and comprehensive geriatric assessment in clinical settings, and drawing on the expertise of team members, 11 domains that captured the multidimensionality of frailty were identified for visual conceptualization. These were: mobility, function, cognition, social support, affect, medication, continence, vision, hearing, balance, and aggression. The group drafted descriptions of levels of ability/impairment within each domain that represented progressively worsening health. Prior to developing the images, the graphic designer presented various visual language options to the group ranging from abstract (icons) to representational (real life). The group selected four visual languages to consider (Figure 2). The graphic designer developed examples of the visual languages, using two of the nine domains (function and social). Following further discussion, the group decided on a visual language that was between abstract and representational which did not identify gender or race (Figure 2, B). Using the selected

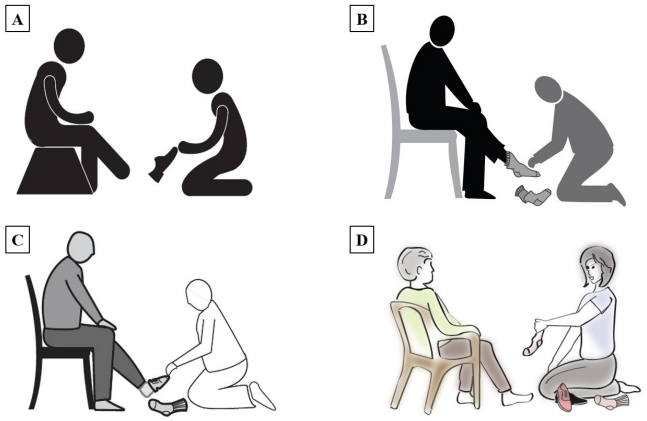


FIGURE 2. Phase 1: Four visual language options ranging from abstract (A) to representational (D)

visual language, the graphic designer developed images for each level of the 11 domains.

Phase 2

In the second phase of development, 36 people participated. In Task 2.1, the most common rankings of the images for each domain were used to define the level order. Order agreement ranged from 36.1% for cognition to 96.7% for medication and affect (Table 1). Based on the order agreement and feedback on the images and domains from Tasks 2.2 and 2.3, we made several changes. The majority of domains were subject to minimal or minor changes (9/11; 82%). These changes involved removing one to two levels or making slight alterations to images, without changing general content. Major changes were made to two of the domains: balance and cognition. Multiple levels were removed/added for balance, and a new set of images were designed for cognition. Overall feedback from health-care professionals supported the face validity of the scale as it was considered to capture frailty. Several health-care professionals suggested the inclusion of some additional frailty indicators to enhance content validity. Based on this feedback, we added three new domains to the PFFS: weight-loss, pain, and daytime tiredness. These revisions resulted in the first complete draft of the PFFS which included 14 domains.

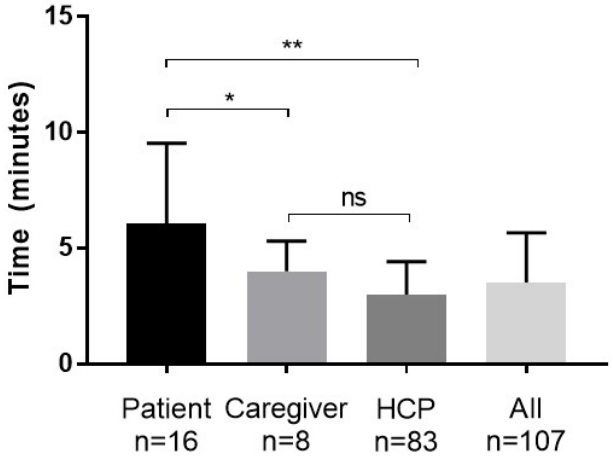
Phase 3

A total of 339 health-care professionals, patients, and caregivers completed the PFFS, based either on their own health or the health of someone they knew well (Task 3.1). Of the 399, PFFS scores were not calculated for 12 participants due to missing data.

The mean PFFS score (n=327) was 13.6 (SD=8.4) and mean FI was 0.29 (SD=0.18). The time to complete the scale (Task 3.1) was recorded for 107 participants (Figure 3). Mean completion time (minutes:seconds) for all participants was 3:31 (SD=2:09). Completion time was significantly longer for

TABLE 1.
Phase 2: Agreement on ranking images from 'no impairment' to 'worsening impairment' for each domain

Domain	*n*	*Same Order n (%)*
Medication	30	29 (96.7)
Affect	30	29 (96.7)
Behaviour	36	32 (88.9)
Vision	30	25 (83.3)
Social	36	27 (75.0)
Continence	30	18 (60.0)
Mobility	36	21 (58.3)
Balance	36	20 (55.6)
Function	36	19 (52.8)
Hearing	30	15 (50.0)
Cognition	36	13 (36.1)



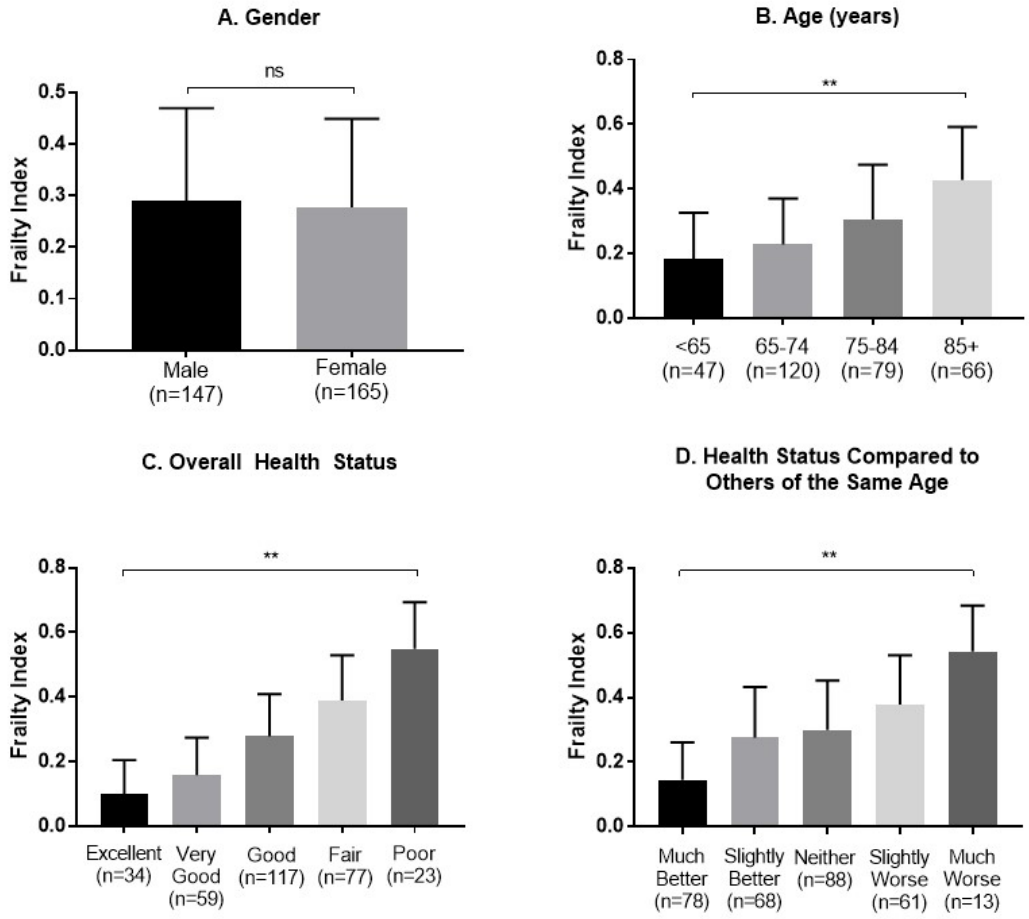
**p<.001
*p<.05
ns=not significant.
HCP - health-care professional

FIGURE 3. Phase 3: Time taken to complete the scale in minutes, organized by group

patients (n=16) (M=6:03, SD=3:28) than for caregivers (n=8) (M=3:59, SD=1:18, p<.05) and health-care professionals/general public (n=83) (M=2:59, SD=1:26, p<.001).

Frailty scores (Task 3.2) increased significantly with increasing age (p<.001), poorer overall health status ratings (p<.001), and poorer comparative health status ratings (p<.001) (Figure 4). Scores did not significantly differ as a function of sex.

A total of 197 health-care professionals completed the PFFS based on a medical case study (Task 3.3). PFFS scores could not be calculated for two individuals due to missing data. Agreement in case study scoring between health-care professionals (n=195) was high; for all domains, at least 85% of participants scored the same, plus or minus one level (Table 2).



**$p<.001$
*$p<.05$
ns=not significant.
FIGURE 4. Phase 3: Total frailty index score as a function of patient characteristics

A total of 146 patients, caregivers, health-care professionals, and the general public rated their understanding of the PFFS domains (Task 3.4). All domains were rated as "understood well" by the majority of participants (range of 64% for 'Function' to 94% for 'Vision' and 'Weight Loss') (Table 3).

Participants completed a questionnaire providing overall feedback about the PFFS (n=319; Task 3.5). Percentage agreement with positive statements regarding appearance, feasibility, and usefulness ranged from 66% (feasible if completed by patients) to 95% (image size appropriate) (Table 4). Participants also provided verbal feedback on their overall impressions of the PFFS and its usefulness/feasibility in practice. The scale was continually adjusted based on feedback during this phase, with 21 patients and caregivers receiving the final prototype of the scale.

During this phase, changes were minimal or minor for all but one domain (13/14; 93%), chiefly with images being changed slightly for clarity and a level removed in five domains (Mobility, Medication, Mood, Function, and Balance). Major changes were made to the images used for Hearing. Verbal feedback on the scale by health-care professionals was generally positive. For example, a health-care professional stated:

> "I think this scale would be helpful as it would be a quick gathering of useful information that could tell us a lot about a patient at [their] current state but also could give us as care workers an indication of [their] future and if other multidisciplinary teams need to be involved to give the patient continued support."

The final prototype of the PFFS was developed by a graphic designer (Figure A1).

Phase 4

The preliminary testing of the PFFS Malay version consisted of 95 participants, including 20 patients, 20 caregivers, 16 health-care assistants, 17 nurses, and 22 medical officers from four public primary health-care clinics in Peninsular

TABLE 2.
Phases 3 and 4: Health-care professionals' agreement on case study scoring

	Phase 3: Canada/UK			*Phase 4: Malaysia*		
Domain	*n*	*Same score*	*Same or ±1 score*	*n*	*Same score*	*Same or ±1 score*
Mobility	197	62.4%	87.8%	55	45.5%	96.6%
Function	197	58.9%	84.8%	55	54.5%	96.6%
Balance	193	60.1%	96.4%	55	44.3%	93.2%
Medication	196	79.1%	98.5%	55	36.4%	89.8%
Mood	196	43.9%	97.5%	55	37.9%	93.1%
Social	193	32.6%	85.5%	55	50.6%	75.9%
Tiredness	197	70.6%	88.8%	55	54.0%	96.6%
Memory	195	59.5%	86.2%	55	52.9%	89.7%
Vision	195	81.5%	99.0%	55	48.3%	96.6%
Hearing	196	88.3%	99.5%	55	77.9%	91.9%
Pain	195	74.9%	100.0%	55	50.6%	94.3%
Weight Loss	196	77.6%	100.0%	55	50.0%	90.9%
Aggression	194	96.9%	100.0%	55	87.4%	98.9%
Bladder Control	196	85.7%	88.8%	55	76.1%	95.5%

TABLE 3.
Phase 3: Understanding by domain as rated by patients, caregivers, and health-care professionals

Domain	*n*	*Understood Well*	*Partially Understood*	*Did Not Understand*
Mobility	146	75.3%	24.7%	0%
Function	142	64.1%	32.4%	3.5%
Balance	141	88.7%	10.6%	0.7%
Medication	137	82.5%	16.8%	0.7%
Mood	141	83.7%	14.9%	1.4%
Social	139	75.5%	23.7%	0.7%
Tiredness	139	87.8%	10.1%	2.2%
Memory	142	78.9%	18.3%	2.8%
Vision	141	93.6%	5.7%	0.7%
Hearing	138	92.8%	5.8%	1.4%
Pain	140	89.3%	10.0%	0.7%
Weight Loss	141	93.6%	6.4%	0%
Aggression	137	90.5%	8.0%	1.5%
Bladder Control	141	85.8%	13.5%	0.7%

Malaysia and Borneo. All participants were multiethnic, with 52.4% Malays, 21.9% Indigenous people, 15.9% Chinese, and 9.8% Indians.

More than two-thirds of the respondents (67.4%), mostly doctors, nurses, and caregivers, completed the scale independently. The remaining one-third of respondents, who required assistance (27.9% minimal assistance; 4.7% significant assistance), were mostly patients and health-care assistants. The feasibility survey filled out by all participants showed that 81% of the respondents thought that the images were easy to understand (Table 4).

Agreement between patients and their caregivers was high, with over 67% of participants scoring the same, plus or minus 1. Score agreement between health-care professionals, who filled out the case study, was also high for all domains, with over 89.7% of participants scoring the same, plus or minus 1, except for social connections where 75.9% of participants scored the same plus or minus 1 (Table 2).

TABLE 4.
Phases 3 and 4: Overall feedback about the PFFS

	Phase 3: Canada/UK				*Phase 4: Malaysia*			
	n	*Agree*	*Neither*	*Disagree*	*n*	*Agree*	*Neither*	*Disagree*
Instructions were clear	316	88.0%	5.7%	6.3%	95	79.8%	12.8%	7.4%
Font size appropriate	318	94.7%	3.1%	2.2%	95	88.3%	8.5%	3.2%
Images easy to understand	319	82.1%	9.1%	8.8%	95	80.8%	11.7%	7.4%
Image size appropriate	318	95.3%	3.1%	1.6%	95	88.3%	8.5%	3.2%
Images are appropriate for each domain[a]	-	-	-	-	95	87.2%	9.6%	3.2%
Feasible if completed by health care professionals[b]	271	90.0%	4.8%	5.1%	-	-	-	-
Feasible if completed by caregivers[b]	271	80.4%	13.7%	5.9%	-	-	-	-
Feasible if completed by patients[b]	269	65.8%	21.6%	12.6%	-	-	-	-
Useful if completed by health care professionals[b]	267	82.0%	13.1%	4.8%	-	-	-	-
Useful if completed by caregivers[b]	269	80.3%	14.1%	5.6%	-	-	-	-
Useful if completed by patients[b]	266	69.9%	20.7%	9.4%	-	-	-	-

[a]Only health-care professionals in Malaysia were invited to answer this question.
[b]Only health-care professionals in Canada and the UK were invited to answer this question.

DISCUSSION

In response to the need for improved standardized frailty assessments for early frailty identification and treatment, and patient-directed and patient-centred care, our group developed a frailty scale using visual images: the Pictorial Fit-Frail Scale (PFFS). Development of the scale followed a four-phase process, in which the scale was iteratively revised, based on feedback at each phase. This scale is simple to use, easy to administer, and demonstrates good content validity. Testing of the scale in Malaysia also showed that the PFFS is generalizable to at least one other country.

The PFFS can capture many perspectives, as it can be used for self-assessment by patients, as well as assessments completed by caregivers and health-care professionals. The PFFS bridges the utility of a short visual frailty scale, such as the Clinical Frailty Scale, and a frailty assessment based on a comprehensive geriatric assessment by allowing for the patient perspective to be recorded. It can also be completed by multiple health-care professionals with varied educational and clinical training working in different health-care settings. This is particularly useful given the lack of geriatric medicine specialists both in Canada and internationally.[16,19]

Limitations of this study include that the scale was only tested in three countries (Canada, UK, and Malaysia) and in three settings (primary care, geriatric medicine, and paramedicine). Even so, patients and caregivers were consulted in the development of the scale, and participants across various levels of frailty were included. During development, we only tested the scale's feasibility and content validity. We are currently testing further the feasibility of the PFFS and other psychometric properties (e.g., inter-rater and test/retest reliability, and construct and predictive validity) across clinical settings in Canada and Malaysia. In the current study we did not assess levels of health literacy. Future testing of the PFSS should investigate whether this scale may be better at assessing frailty in patients with inadequate health literacy using validated measures. Using visual images may reduce the accuracy of the assessment as the interpretation of the visual images and the answers are subjective. Even so, the PFFS allows self-assessment by people with communication and language barriers, as noted by a health-care professional who commented that the PFFS "will give (literally) a picture of the patient's overall feelings towards [their] health and well-being".

The ability of the health-care system to cope with the influx of frail older people is challenged by the lack of people (especially physicians and nurses) specifically trained in multidimensional assessment and management; without important changes being made, it seems inevitable that care provided to older adults will suffer.[2,3] It is vital that frailty is identified and treated early; this can be achieved through more routine and better recognition. The PFFS could assist with this. It could be used as a stand-alone tool to assist with care decision-making, but it can also be used for case finding and followed up by additional assessments. In this study, we propose scoring one point for every additional level of the PFFS for a total score 0–43; however, future testing will determine at what score of the PFFS various frailty levels can be operationalized. Currently, the 0.1, 0.2, 0.3, and 0.45[20,21] cut points to capture vulnerability, and mild, moderate, and severe frailty correspond to 4, 9, 13, and 19 on the raw PFFS score.

One of the reasons for undertaking this project was to empower older patients to actively participate in their care by

giving them a practical tool to communicate their function or impairment to their health-care professional on a broad number of domains. As part of our future larger multisetting study, we plan to examine whether implementing PFFS assessments in clinical settings will improve shared decision-making, as well as patients' and caregivers' experience and satisfaction with the care they receive. We anticipate that the PFFS will support patient- and family-centred care.

ACKNOWLEDGEMENTS

Phases 1-3 were supported by a Nova Scotia Health Research Foundation Development Innovation Grant (MED-DI-2013-9055, EGMS 1773) and by the Fountain Family Innovation Fund through the QEII Health Sciences Centre Foundation. Phase 4 was supported by the Ministry of Health Malaysia Research Grant and the Sarawak Foundation, Malaysia.

CONFLICT OF INTEREST DISCLOSURES

The authors declare that no conflicts of interest exist.

REFERENCES

1. Hoover M, Rotermann M, Sanmartin C, *et al*. Validation of an index to estimate the prevalence of frailty among community-dwelling seniors. *Health Rep*. 2013;24(9):10–17.
2. Clegg A, Young J, Iliffe S, *et al*. Frailty in elderly people. *Lancet*. 2013;381(9868):752–62.
3. Theou O, Yu S, Rockwood K, *et al*. Focus on frailty: essential as the population ages. *Med Today.* 2015;16(8):28–33.
4. Theou O, Rockwood K. Comparison and clinical applications of the frailty phenotype and frailty index approaches. *Frailty in Aging*. 2015;41:74–84.
5. Morley JE, Vellas B, van Kan GA, *et al*. Frailty consensus: a call to action. *J Am Med Dir Assoc*. 201314(6):392–97.
6. Fried LP, Tangen CM, Walston J, *et al*. Frailty in older adults: evidence for a phenotype. *J Gerontol A Biol Sci Med Sci*. 2001;56(3):M146–57.
7. Theou O, O'Connell MD, King-Kallimanis BL, *et al*. Measuring frailty using self-report and test-based health measures. *Age Ageing*. 2015;44(3):471–77.
8. Theou O, Rockwood. Should frailty status always be considered when treating the elderly patient? *Aging Health*. 2012;8(3);261–71.
9. Rodriguez-Manas L, Feart C, Mann G, *et al*. Searching for an operational definition of frailty: a Delphi method based consensus statement. The Frailty Operative Definition-Consensus Conference Project. *J Gerontol A Biol Sci Med Sci*. 2012;68(1):62–67
10. Theou O, Squires E, Mallery K, *et al*. What do we know about frailty in the acute care setting? A scoping review. *BMC Geriatr*. 2018;18(1):139.
11. Tomlinson D, von Baeyer CL, Stinson JN, *et al*. A systematic review of faces scales for the self-report of pain intensity in children. *Pediatrics*. 2010;126(5):e1168–98.
12. Zucchella C, Bartolo M, Bernini S, *et al*. Quality of life in Alzheimer disease: a comparison of patients' and caregivers' points of view. *Alzheimer Dis Assoc Disord*. 2015;29(1):50–54.
13. Hung MC, Yan YH, Fan PS, *et al*. Measurement of quality of life using EQ-5D in patients on prolonged mechanical ventilation: comparison of patients, family caregivers, and nurses. *Qual Life Res*. 2010;19(5):721–27.
14. Bahrami M, Parker S, Blackman I. Patients' quality of life: a comparison of patient and nurse perceptions. *Contemp Nurse*. 2008;29(1):67–79.
15. Giovannetti ER, Reider L, Wolff JL, *et al*. Do older patients and their family caregivers agree about the quality of chronic illness care? *Int J Qual Health Care*. 2013;25(5):515–24.
16. Hogan DB, Borrie M, Basran JF, *et al*. Specialist physicians in geriatrics—report of the Canadian Geriatrics Society Physician Resource Work Group. *Can Geriatr J*. 2012;15(3):68–79.
17. Canadian Medical Association (CMA). Number of physicians by province/territory and specialty, Canada, 2018. Masterfile, January 2018. Ottawa, ON: Canadian Medical Association; 2018.
18. Searle SD, Mitnitski A, Gahbauer EA, *et al*. A standard procedure for creating a frailty index. *BMC Geriatr*. 2008;8:24.
19. Pitkälä KH, Martin FC, Maggi S, *et al*. Status of geriatrics in 22 countries. *J Nutr Health Aging*. 2018;22(5):627–31.
20. Theou O, Blodgett JM, Godin J, *et al*. Association between sedentary time and mortality across levels of frailty. *CMAJ*. 2017;189(33):E1056–64.
21. Jayanama K, Theou O, Blodgett JM, *et al*. Frailty, nutrition-related parameters, and mortality across the adult age spectrum. *BMC Med*. 2018;16(1):188.

Correspondence to: Olga Theou, PhD, Geriatric Medicine, Dalhousie University, Rm. 1313 Camp Hill Veterans' Memorial Building, 5955 Veterans' Memorial Lane, Halifax, NS, Canada B3H 2E1
E-mail: Olga.Theou@dal.ca

APPENDICES

Appendix A: Phase 2 Interview Script

Task-Oriented Interview Guide (**Bolded** text is read aloud to the participants)

Introduction

We are trying to develop a scale that will tell us how fit or frail someone is using pictures. In order to identify someone's fitness/frailty level we need to assess their health status in a number of different areas. We have developed pictures to represent different levels of ability in various areas of health. For example, these pictures represent X, these pictures represent X.

Task 1: The goal of this task is to examine whether people agree with our proposed order and/or whether the pictures represent the level we want. For example, people may agree that level 5 (dressing) is before level 6 (toileting) but may not be able to recognize that the picture shows someone getting helped with dressing.

1. **Could you please pick up the pictures of X and put them in an order that make sense to you, starting with the person who has the highest level of X. While you are doing can you tell me what you see in terms of this person's X?**
2. **Can you now do the same with the X domain? ….***repeat for all domains*
3. *If person has hard time explaining the levels and only describe pictures or if we want to explore further some of the answers of the participants we can ask them.* **Can you explain to me why you think this person has higher X level compared to this picture (point to lower level)? Then can you explain to me why you think this person has lower level of X compared to this picture (point to higher level)?**

Task 2: The goal of this task is to examine whether there are any problems with picture and order when we get in real situations scenarios. We expect that some new problems that did not come up before may arise. For example, there may be a level that we are missing that the participants thought that would better identify the person/patient they are describing or themselves. In addition, we want to understand their thinking process while they are picking levels.

A. Physician, nurses, caregivers, and younger adults

1. **Think about a patient/person over the age of 65 that you know very well.** *If they have hard time ask to pick an older person who they are the most familiar with.* **For each domain can you pick the level that most closely matches their current state and can you explain why you chose each level while you are doing it?** *If this person died ask them to describe the state that they remember them the most*
2. *While participants are assigning levels we pick some domains and ask participants* **Can this person do X activity** (higher level than what they picked or lower level of what they picked)?
3. *After task is completed ask* **Did you have difficulty with placing the level of this person in any of these domains**? If yes **can you explain what was difficult?**
4. **Is this person a male or female?**
5. **How old is this person?**
6. **Would you say his/her health is excellent, very good, good, fair, or poor?**
7. **How would you assess his/her health compared to others of the same age? Much better, Slightly better, Neither better nor worse, Slightly worse and Much worse.**

B. Older adults

1. **For each domain can you pick the level that most closely matches your current state?**
2. *While participants assigning levels we pick some domains and ask participants* **Can you do the X activity (higher level than what they picked) or the X activity (lower level of what they picked)?**
3. *After task is completed we ask* **Did you have difficulty with placing your level in any of these domains**? If yes **can you explain what was difficult?**
4. **How old are you?**
5. **Would you say your health is excellent, very good, good, fair, or poor?**
6. **How would you assess your health compared to others of the same age? Much better, Slightly better, Neither better nor worse, Slightly worse and Much worse.**

Task 3: The goal of this task is to examine whether we are missing any domains/levels and get some ideas about how this scale may be formatted.

A. Physicians and nurses

1. **Was it easy to understand the pictures?**
2. **Were the pictures too small or too big?**
3. **How do you think a scale like this should look? E.g. one page, two pages, horizontal, vertical**
4. **Are we missing any other domains that are important for frailty?**
5. **Are any of the domains missing obvious levels?**
6. **Is there anything else that you think needs to be added to or changed in this scale in order to capture someone's frailty?**
7. **Do you think a scale like this would be helpful in your practice?**

B. Patients, caregivers, and general public

1. **Was it easy to understand the pictures?**
2. **Were the pictures too small or too big?**
3. **How do you think a scale like this should look? E.g. one page, two pages, horizontal, vertical**
4. **Is there anything else that you think needs to be added to or changed in this scale in order to capture someone's health status?**

TABLE A1

Phase 3—Feasibility questionnaire

Please give us your overall opinion about the scale by marking an X in one of the boxes indicating your degree of agreement or disagreement with the following statements: *(NOTE: for questions 5–10, record N/A if you are not a health professional.)*

	Strongly Agree	*Agree*	*Neither Agree nor Disagree*	*Disagree*	*Strongly Disagree*	*N/A*
1 The instructions of the scale were clear.						
2 The font size was appropriate.						
3 The pictures were easy to understand.						
4 The picture size was appropriate.						
5 This scale, if completed by health-care professional, would be feasible in my practice.						
6 This scale, if completed by a patient, would be feasible in my practice.						
7 This scale, if completed by a caregiver, would be feasible in my practice.						
8 This scale, if completed by health-care professional, would be useful in my practice.						
9 This scale, if completed by a patient, would be useful in my practice.						
10 This scale, if completed by a caregiver, would be useful in my practice.						

Please add any other comments/concerns/questions you have about the scale. (If you need additional space, continue on back of page.)

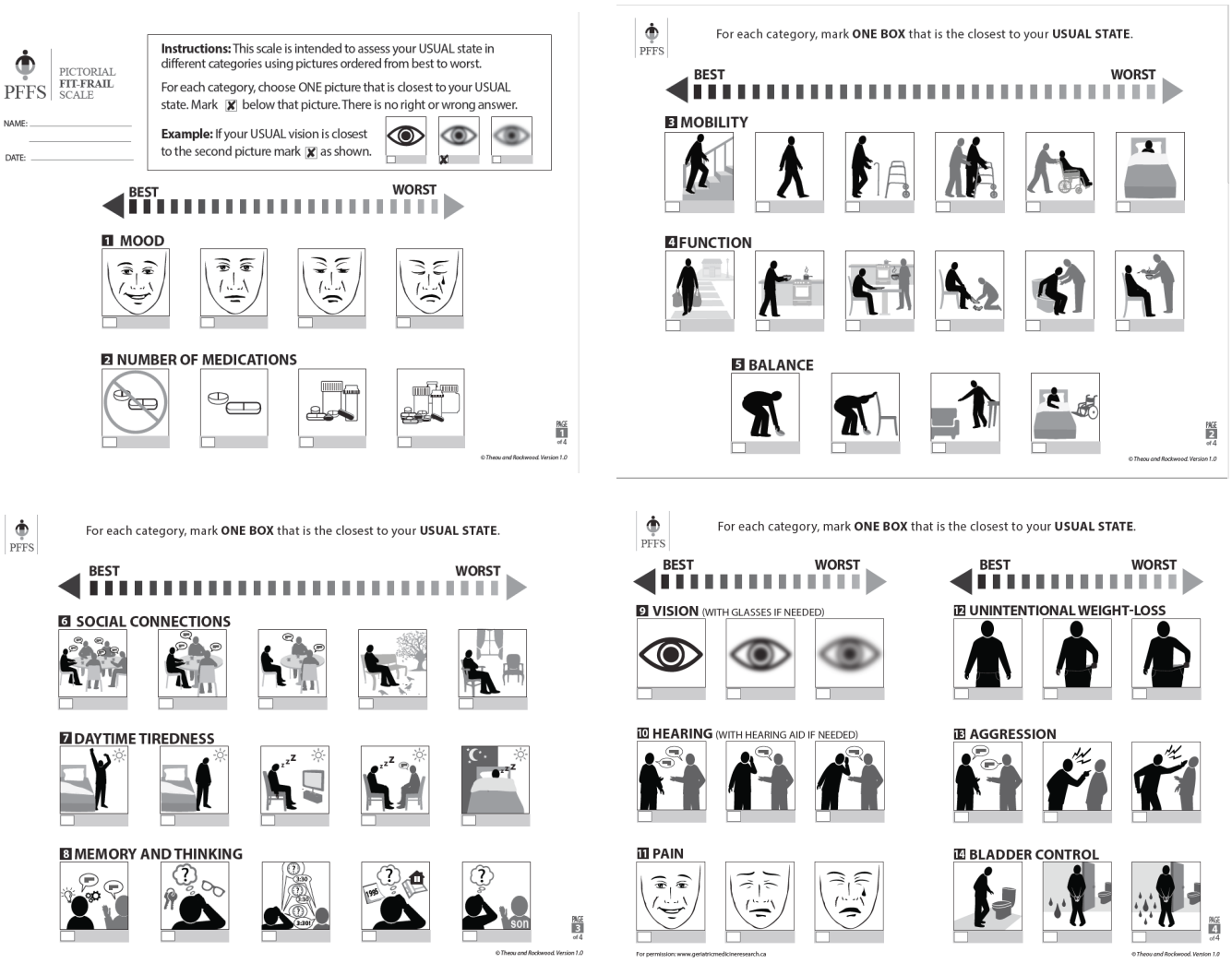


FIGURE A1. Pictorial Fit-Frail Scale—final prototype.
Note: Permission to use the copyrighted Pictorial Fit-Frail Scale can be obtained by visiting the website: www.geriatricmedicineresearch.ca