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Clinimetric Properties of the "FIND-NEEDS" to Screen Geriatric Conditions

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Keywords
FIND-NEEDS · Assessment · Geriatric screening · Screening · Reliability · Validity

Abstract
Introduction: Comprehensive geriatric assessment (CGA) is used to thoroughly assess and identify complex healthcare problems among older adults. However, administration of CGA is time-consuming and labor intensive. A simple screening tool with the mnemonic "FIND-NEEDS" was developed to quickly identify common geriatric conditions. The present study was to evaluate the clinimetric properties of the FIND-NEEDS. ***Methods:*** The participants comprised first-visiting older adults aged 65 years and above (and who were able to communicate by themselves or with the help of a caregiver) who were assessed (October to December, 2021) using the FIND-NEEDS and CGA at geriatric outpatient clinics of a tertiary, referred medical center. The FIND-NEEDS was examined for its criterion-related validity and compared with the CGA results. Two types of scoring (summed score and binary score) of FIND-NEEDS and CGA were analyzed using Spearman correlation, sensitivity and specificity, and area under receiver operating characteristic curve (AUC). ***Results:*** The mean age of the 114 outpatients was 78.3 ± 7.6 years, and 79 (69.3%) were female. The internal consistency was excellent when using all FIND-NEEDS items, and was acceptable when using domain scores. Exploratory factor

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analysis showed that most of the FIND-NEEDS domain scores had factor loadings higher than 0.3. Intercorrelations of binary scores between domains of FIND-NEEDS and CGA showed most domains were moderately correlated. The overall correlation of summed scores between FIND-NEEDS and CGA was high. The FIND-NEEDS summed score was moderately correlated with CGA score ($r = 0.494$; $p < 0.001$), and the binary score showed excellent correlation ($r = 0.944$; $p < 0.001$). When using the CGA score as the gold standard, the FIND-NEEDS showed excellent AUC (0.950), sensitivity (1.00), and specificity (0.90). ***Discussion/Conclusion:*** The present study demonstrated that the FIND-NEEDS had acceptable clinimetric properties to screen for geriatric problems among older adults. Further in-depth assessment and care plan can then be conducted afterwards.

Introduction

Comprehensive geriatric assessment (CGA) [1] is used to thoroughly assess and identify complex health and care problems among older adults. With the use of CGA, healthcare professionals can obtain a holistic overview of older people with complex needs, which is essential for the development of individualized, patient-centered care plans in geriatric care. Veronese et al. reviewed CGA on health outcomes and found that CGA reduces (i) nursing home admission, risk of falls, and pressure sores in hospital medical settings; (ii) the risk of delirium in hip fracture; and (iii) the risk of physical frailty among community-dwelling older adults [2].

However, the administration of CGA is very time-consuming and labor intensive because the CGA contains many tools and items [3, 4]. The growing aging population exacerbates the workloads of healthcare providers who have insufficient time to conduct CGA. Moreover, CGA has to be conducted by trained professionals [5]. Such inconvenience often precludes healthcare providers in geriatric care from arranging CGA for holistic overview and thorough care management. Therefore, a series of easy-to-administer, office-based screening questions could be used quickly among older adults to identify common geriatric conditions which would reduce such problems [6]. Previous studies have found that an early comprehensive geriatric screening followed by CGA and management significantly decreases admission and mortality among older patients visiting emergency departments [7] and reduces the 30-day readmission rate of older hospitalized adults [4].

Several screening tools had been proposed in the literature to replace or to supplement CGA, such as the Vulnerable Elders Survey (VES-13) [8], DEEP-IN [9], Kihon Checklist [10], Brief Risk Identification of Geriatric Health Tool (BRIGHT) [11], Targeted Geriatric Assessment (TaGA) [12], Rapid Geriatric Assessment (RGA) [3], Manageable Geriatric Assessment (MAGIC) [13], Edmonton Frail Scale [14], and Geriatric 8 (G8) [15]. Moreover, Integrated Care for Older People (ICOPE) corresponding to intrinsic capacity has been proposed recently by the World Health Organization (WHO) [16, 17]. The clinimetric properties and clinical impact on relevant outcomes of these screening instruments have not been thoroughly examined [5].

Moreover, some practical issues need to be addressed. First, most instruments have relatively limited spectrums of domains that affect the health status of older people. For example, some important conditions in geriatric care (e.g., polypharmacy, urinary incontinence, sensory impairment, or social function) are not assessed. Second, some instrument items use a relatively intricate method or subjective rating (e.g., whispered voice test), which needs additional training for the assessors. Third, some instruments focus on specific conditions (e.g., Kihon Checklist for frailty) or targeted populations (e.g., G8 for cancer) [5], and some instruments are divided into several modules (e.g., ICOPE) [16] which may cause administrative burden to the assessors in determining whether to conduct the further stage of evaluation and referral pathways. Moreover, using different modules by steps may result in some domains (e.g., falls, urinary incontinence, polypharmacy, social interaction) being overlooked or deferred unless the assessors screen the next module. Fourth, some screening questions are not based on the patient's perspectives. For example, old people may be reluctant to accept further advice or referred managements if the detected abnormality does not cause major discomfort or affect their daily life (e.g., visual or hearing impairment by tests). Therefore, geriatric care needs a screening instrument that has theoretical framework and is comparable to the major domains of CGA to quickly and easily understand the holistic and thorough health needs for older people.

Based on the literature review of screening tools of geriatric assessment and incorporating the theoretical concept of intrinsic capacity, key principles were considered. First, such a screening instrument should be able to be used by non-geriatric healthcare workers or volunteers with minimal training in only a few items. Second, domains should either be derived from the commonly used simple screening tools or further condensed

and modified from the core items of existing screening instruments. Third, the instrument should focus on whether daily life of an older adult is affected. Eventually, a screening tool was developed including 11 domains of potentially manageable conditions with mnemonic "FIND-NEEDS" (Suppl. Table S1), namely, Function (functional impairment, falls, and frailty), Incontinence, Nutrition, Dementia, Number of medications, Eyes, Ear, Depression, and Social interaction. The 11 domains also correspond with the intrinsic capacity framework [16] and the 4M model (what matters, medications, mentation, and mobility) [18]. Detailed information regarding the development of the FIND-NEEDS is reported in the "*FIND-NEEDS development*" subsection (in the **Methods** section). Although the FIND-NEEDS was developed by experts with good content validity, the clinimetric properties of the FIND-NEEDS have not been fully examined. Moreover, no previous empirical studies have examined if the FIND-NEEDS is comparable to the gold standard of CGA results in holistic assessment for older people. In order to provide useful and time-saving assessments for geriatric care in busy clinical settings, the present study evaluated the newly developed instrument (i.e., FIND-NEEDS) in assessing geriatric needs.

Materials and Methods

Participants and Data Collection

Between October 2021 and December 2021, data for the present study were collected at geriatric outpatient clinics of a tertiary, referred medical center. The participants comprised first-visiting older adults aged 65 years and above (who were able to answer the study questionnaire by themselves or with the help of a caregiver). Individuals excluded from participation included those who were institutionalized, could not mobilize with or without assisting devices, could not communicate, or had any acute or chronic condition that could affect the ability of answering the questionnaire and completing the objective evaluation. Written informed consent was obtained from participants or from their legal guardians if the patient had serious cognitive impairment.

The research assistants interviewed the participants to obtain the following information: age (in years), sex (male or female), educational level (no formal education, primary school, junior high, senior high or college/above), marital status (married, cohabiting, widowed, or other), living status (living alone or not), current cigarette smoking (yes or no), current alcohol drinking (yes or no), body mass index (kg/m^2), and history of chronic diseases (including hypertension, diabetes mellitus, hyperlipidemia, stroke, cardiovascular disease, respiratory disease, liver disease, gastrointestinal disease, renal disease, musculoskeletal disease, eye disease, psychiatric disease, urological disease, and cancer).

In addition to the demographic and medical information of the patients, data were also collected regarding the FIND-NEEDS and CGA. The FIND-NEEDS was completed by the patients or their caregivers accompanied under assistance of research assistants, and CGA was performed by a geriatric care practitioner.

Comprehensive Geriatric Assessment

The core measures of the CGA comprise metrics of physical function, falls, cognitive impairment, depression, visual and hearing impairments, nutrition, pain, urinary incontinence, medication-related problems, tubes, caregiver issues, and socioeconomic issues. The assessment tools involved physical function (assessed by the Katz Index of Activities of Daily Living, ADLs), cognitive impairment (defined as scores <8 for the participants with a high school education on the Chinese version of the modified Short Portable Mental Status Questionnaire, SPMSQ [19], depressive mood (defined as scores ≥2 on the Chinese version of the five-item Geriatric Depression Scale, GDS-5 [20], medication-related problems (defined as currently using >eight medications, poor adherence, adverse drug reactions, and potentially inappropriate medications), malnutrition (defined as scores <12 on the Mini-Nutritional Assessment-Short Form, MNA-SF), requirements of social resources, as well as health-related quality of life (assessed by the Chinese version of the EQ-5D system).

Development of FIND-NEEDS Screening Tool

The FIND-NEEDS was designed based on the following principles. First, some domains were derived from the well-established and commonly used screening tools, such as the Patient Health Questionnaire-2 (PHQ-2) [21] and Geriatric Depression Scale (GDS-5) [20] for screening depression, and the CSHA Clinical Frailty Scale (CFS) [22] for screening frailty. Second, some domains were further condensed and modified from the core items of existing screening tools. For example, two shared items from the Malnutrition Universal Screening Tool (MUST) and the Mini-Nutritional Assessment-Short Form (MNA-SF) [23, 24] were selected for screening malnutrition. Items for cognitive impairment included the "three-item recall" test from the Mini-Cog assessment with a simple question [25] for objective and subjective memory problems, and an item concerning high-risk medications from the 4Ms model as one of medication-related problems [18]. Third, some domains contained combinations of several core items into a single question, for example, core questions of the Practice Guideline for Prevention of Falls by the American Geriatrics Society and British Geriatrics Society [26] and those of incontinence proposed by Moore and Siu [27], as well as selecting two items of activities of daily living from the Katz Index [28] for screening functional impairment. Fourth, the items concerning sensory impairment focused on affected daily life or identified symptoms/signs (e.g., memory impairment, medication-related problems). The reason for focusing on affected daily life and identified symptoms/signs is because these are important factors associated with quality of life. Fifth, to easily and quickly understand the health status of older adults, the screening instrument was designed to be performed by non-geriatric healthcare workers or volunteers with minimal training or by self-evaluation with assistance on only a few items.

A total of 24 items were drafted to screen for common geriatric conditions (online suppl. Table S1; for all online suppl. material, see https://doi.org/10.1159/000539261), with frailty, falls, and disability being the very first items of "Function" in the FIND-NEEDS. Frailty, falls, and disability are distinct with serial progression of decreased mobility and functional ability, with overlapping concepts that share common risk factors [5]. Screening for disability is suggested first to identify those with severe functional

impairment [3], which is directed to provision of care skills, supportive services, or long-term care. Falls is the geriatric condition that is an indicator of underlying frailty and a predictor of future disability. Further screening of falls and frailty for potential mobility problems is suggested among those without disability. More specifically, "Function" in FIND-NEEDS corresponds to locomotion and vitality in intrinsic capacity; "Dementia" in FIND-NEEDS corresponds to cognition in intrinsic capacity and mentation in the 4Ms; "Eyes and Ear" in FIND-NEEDS corresponds to the sensory components in intrinsic capacity; "Depression" in FIND-NEEDS corresponds to psychological components in intrinsic capacity and mentation in 4Ms; Nutrition in FIND-NEEDS corresponds to vitality in intrinsic capacity; "Number of medications" in FIND-NEEDS corresponds to medications in 4Ms; "Falls, incontinence, social interaction" in FIND-NEEDS corresponds to the second module of "falls, incontinence, social support" in intrinsic capacity. Previous study of the content validity of the FIND-NEEDS screening tool was based on the expert opinions after modification and amendment showed good Item-Level and Scale-Level Content Validity Index [29].

Data Analysis

All the statistical analyses in the present study were conducted using the JASP Version 0.16.3 (JASP Team, 2022; https://jasp-stats.org/). Descriptive statistics of the data comprised means (SDs) or frequencies (percentages). Internal consistency of the FIND-NEEDS was conducted using three methods: traditional Cronbach's α [30], McDonald's ω [31], and greatest lower bound (GLB) [32]. Cronbach's α was used for calculating internal consistency [33]; McDonald's ω was used for adjustment of the tau-equivalence assumptions when this assumption is violated [34]; GLB was used because it is less impacted by skewed data (which is common for older people's data) than α and ω [33, 35]. Moreover, internal consistency of the FIND-NEEDS was examined for its item scores (i.e., 24 items) and its domain scores (i.e., 11 domains) by using item analysis and item-total correlation test. The internal consistency value is interpreted as acceptable when larger than 0.6 and good when larger than 0.7 [36].

Apart from internal consistency, the factor structure of the FIND-NEEDS was assessed using parallel analysis (PA) and exploratory factor analysis (EFA) on its domain scores. In PA, simulated datasets were generated to identify the random eigenvalue. Then, the eigenvalue derived from the present dataset was compared with the random eigenvalue. When the eigenvalue of a factor from the present dataset was higher than its random eigenvalue, the factor was considered to be real [37]. In EFA, Kaiser-Meyer-Olkin and Bartlett's tests were conducted first to ensure that the data were suitable for EFA. Kaiser-Meyer-Olkin value larger than 0.6 and significant Bartlett's test indicate that the data can be used for EFA [38]. Then, EFA with principal axis factoring extraction method is used if the data are suitable. Root mean square error of approximation smaller than 0.05 in the EFA further indicates that identified factor structure of FIND-NEEDS was supported [39]. Factor loadings of the FIND-NEEDS domain scores were calculated in the EFA, and a factor loading larger than 0.3 indicated good loading [40].

Finally, the FIND-NEEDS was examined for its criterion-related validity with the gold standard of CGA results. Two FIND-NEEDS scores were used: (i) a summed score that added all the FIND-NEEDS domain scores, and (ii) a binary score using the FIND-NEEDS summed score converted into 0 (no problems) or 1 (having problems). The two FIND-NEEDS scores were examined using the following statistical analyses: (i) Spearman correlation with CGA results; (ii) sensitivity and specificity; and (iii) area under receiver operating characteristic curve (AUC).

Table 1. Characteristics of participants receiving screening and assessment (N = 114)

	Mean (SD) or *n* (%)
Age, years	78.3 (7.6)
Sex (male)	35 (30.7)
Educational level	
No formal education	25 (22.3)
Primary school	42 (37.5)
Junior high	16 (14.3)
Senior high	9 (8.0)
College or above	20 (17.9)
Marital status	
Married or cohabiting	73 (65.2)
Widowed	35 (31.3)
Other	4 (3.6)
Living alone	8 (7.1)
Current cigarette smoker	3 (2.7)
Current alcohol drinker	13 (11.7)
Underlying diseases	
Hypertension	69 (62.2)
Diabetes mellitus	39 (35.1)
Hyperlipidemia	24 (21.6)
Cardiovascular accident	8 (7.2)
Cardiovascular disease	37 (33.3)
Neurological disease	13 (11.7)
Respiratory disease	10 (9.0)
Liver disease	9 (8.1)
Gastrointestinal disease	26 (23.4)
Renal disease	18 (16.2)
Musculoskeletal disease	31 (27.9)
Eye disease	41 (36.9)
Psychiatric disease	30 (27.0)
Urological disease	25 (22.5)
Cancer	16 (14.4)

Results

A total of 114 older adults were enrolled. Table 1 shows characteristics of the participants receiving screening and assessment. Their mean age was 78.3 years (SD ± 7.6), and 35 were males (30.7%). The majority of the participants were married or cohabiting (96.43%), and over half of them had an educational level at primary school or below (59.82%). Very few of the participants lived alone (7.14%).

Table 2. Domain properties for FIND-NEEDS (N = 114)

Domain	n (%) of having problem	Factor loading	Item-total correlation
F: Function, falls, frailty	94 (82.5)	0.42	0.36
I: Incontinence	38 (33.3)	0.47	0.36
N: Nutrition	36 (31.6)	0.24	0.17
D: Dementia	82 (71.9)	0.61	0.50
N: Number of medications	72 (63.2)	0.46	0.32
E: Eyes	39 (34.2)	0.26	0.18
E: Ears	35 (30.7)	0.15	0.12
D: Depression	59 (51.8)	0.60	0.46
S: Social interaction	53 (46.5)	0.37	0.25

For exploratory factor analysis: Kaiser-Meyer-Olkin value = 0.67; Bartlett's test χ^2 = 110.56, df = 36 (p < 0.001), X^2/df = 3.07; root mean square residual error of approximation = 0.044 (90% CI = 0.00, 0.09). Area Under the ROC Curve (using FIND-NEEDS binary score and CGA binary score): AUC=0.95. Accuracy = 0.99; precision = 0.99; sensitivity = 1.00; specificity = 0.90. FIND-NEEDS domain score: internal consistency using greatest lower bound (GLB) method = 0.76 (95% CI, 0.70, 0.84); using McDonald's omega = 0.64 (95% CI, 0.54, 0.73); using Cronbach's alpha = 0.62 (95% CI, 0.50, 0.71). FIND-NEEDS item score: internal consistency using GLB method = 0.98 (95% CI, 0.99, 1.00); using McDonald's omega = 0.92 (95% CI, 0.90, 0.94); using Cronbach's alpha = 0.92 (95% CI = 0.89, 0.94).

Table 2 shows the percentages of participants having problems in each domain. More than 80% of the participants had potential problems in the domains of Function (functional impairment, falls, and frailty). More than a half of participants had problems in the domains of Dementia, Number of medications, and Depression. Nearly one-third of participants had problems in the domains of Incontinence, Nutrition, Eyes or Ear problems. In all internal consistency methods, the internal consistency was excellent when using all FIND-NEEDS items (α = 0.917; ω = 0.922; GLB = 0.982), and was acceptable when using FIND-NEEDS domain scores (α = 0.616; ω = 0.635; GLB = 0.760). The unidimensionality of the FIND-NEEDS domain scores was supported by the PA (Fig. 1). Moreover, Kaiser-Meyer-Olkin value (0.67) together with significant Bartlett's test χ^2 (110.56 [df = 36]; p < 0.001) supported that FIND-NEEDS domain scores were suitable for EFA. EFA results showed that most of the FIND-NEEDS domain scores had factor loadings higher than 0.3, except for Nutrition (0.240), Eyes (0.257), and Ears (0.154). Fit index of root mean square residual error of approximation (0.044) also supported the unidimensionality of the FIND-NEEDS.

Table 3 shows intercorrelations of binary scores between domains of FIND-NEEDS and CGA. Most domains showed moderate correlation between FIND-NEEDS and CGA, except for low correlation in dementia and weak correlation in social interaction. The overall correlation of summed scores between FIND-NEEDS and CGA was high.

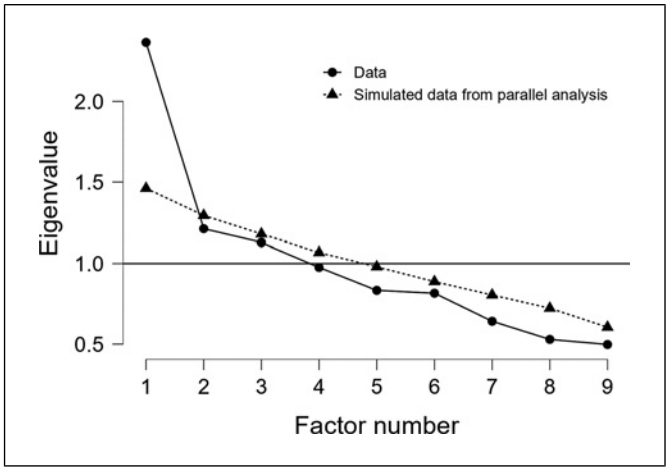

Fig. 1. PA of the FIND-NEEDS.

Table 4 shows the intercorrelations between FIND-NEEDS domains. Depression was significantly correlated with most domains except for eyes and ears. Hearing impairment (ears) was not correlated with other domains of impairment, while visual impairment (eyes) and malnutrition were significantly correlated only with one other domain of impairment (i.e., dementia and depression, respectively).

Figure 1 shows PA of the FIND-NEEDS. The FIND-NEEDS summed score was moderately correlated with CGA score (r = 0.494; p < 0.001). After converting the FIND-NEEDS summed score into a binary score (0 = no

Table 3. Intercorrelations of binary scores between domains of FIND-NEEDS and comprehensive geriatric assessment (CGA)

	CGA										
FIND-NEEDS	1[a]	2[a]	3[a]	4[a]	5[a]	6[a]	7[a]	8[a]	9[a]	Sum score[a]	Sum score[b]
1	0.68***										
2		0.63***									
3			0.44***								
4				0.39***							
5					0.53***						
6						0.47***					
7							0.64***				
8								0.40***			
9									0.02		
Sum score[a]										0.94***	
Sum score[b]											0.69***

1: Function, falls, frailty (F); 2: Incontinence (I); 3: Nutrition (N); 4: Dementia (D); 5: Number of medications (N); 6: Eyes (E); 7: Ears (E); 8: Depression (D); 9: Social interaction (S). ***$p < 0.001$. [a]Phi coefficient. [b]Spearman's rank correlation coefficient.

Table 4. Intercorrelations between FIND-NEEDS domains ($N = 114$)

FIND-NEEDS	r (p)								
	1	2	3	4	5	6	7	8	9
1	–								
2	0.23*	–							
3	0.17	−0.04	–						
4	0.17	0.28**	0.17	–					
5	0.17	0.31**	0.13	0.25**	–				
6	0.14	0.08	−0.01	0.33***	0.05	–			
7	0.11	0.13	0.04	0.16	−0.08	0.12	–		
8	0.25**	0.19*	0.26**	0.34***	0.33***	0.14	0.07	–	
9	0.20*	0.27**	0.01	0.23*	0.13	−0.04	−0.01	0.24**	–

1: Function, falls, frailty (F); 2: Incontinence (I); 3: Nutrition (N); 4: Dementia (D); 5: Number of medications (N); 6: Eyes (E); 7: Ears (E); 8: Depression (D); 9: Social interaction (S). *$p < 0.05$. **$p < 0.01$. ***$p < 0.001$.

problems, 1 = having problems), the FIND-NEEDS binary score had a high correlation with CGA score ($r = 0.944$; $p < 0.001$). Moreover, the FIND-NEEDS binary score showed high AUC (0.950), sensitivity (1.00), and specificity (0.90) when using the CGA score as the gold standard.

Discussion

The present study evaluating clinimetric properties of the FIND-NEEDS showed that the validity and reliability were acceptable with excellent internal consistency. Using the CGA as the gold standard, FIND-NEEDS binary scores showed moderate to high correlations (r = 0.494–0.944; $p < 0.001$) as well as excellent sensitivity (1.00) and specificity (0.90) with a satisfactory AUC (0.950). Although the CGA has the huge benefit with regards to holistic assessment of older people, it has been criticized for its administration burden [3, 5]. The FIND-NEEDS includes important domains of geriatric care to help healthcare providers efficiently assess geriatric needs for older people and is a feasible brief tool to screen for geriatric problems in busy clinical settings.

The present study showed that most domains had moderate correlations between FIND-NEEDS and CGA, except for a low correlation in dementia and a weak correlation in social interaction. Dementia screening in the CGA comprised the SPMSQ, which does not include direct testing of episodic declarative memory and is more accurate in identifying individuals with moderate or

severe impairment of dementia [41], while the dementia screening in the FIND-NEEDS included directly asked presentation of memory impairment and three-item recall which may detect individuals with mildly impaired dementia. Social interaction in FIND-NEEDS included directly asked questions about living alone or loneliness and social activities, while social conditions in CGA include living alone or social support needed. However, the FIND-NEEDS may identify more potential problems for further assessment of geriatric conditions.

Although the present study found that most clinimetric properties of the FIND-NEEDS (especially in its scale level) were acceptable to satisfactory, some domains had relatively low associations with the entire FIND-NEEDS instrument. More specifically, Eyes, Ears, and Nutrition were the three domains with low factor loadings in the EFA. In 2007, these three domains were not considered as geriatric syndrome by Inouye, et al. [42]. In fact, visual and hearing impairments were not listed as screening domains in most screening tools except the ICOPE and DEEP-IN [3, 8, 10–12, 15, 16]. Geriatric syndromes (geriatric conditions) are multifactorial conditions that are prevalent among older adults and are believed to develop when an individual experiences accumulated impairments in multiple systems that compromise their compensatory ability. The low factor loadings of visual and hearing (sensory) impairments may be explained by the following reasons. First, in contrast to the concurrence of geriatric conditions due to multifactorial causes and with bidirectional associations [43], sensory impairments are usually caused by sensory organ-specific diseases (e.g., cataract or glaucoma, age-related, drug-induced, or chronic otitis media), but less commonly caused by other diseases (except for diabetes) or conditions. Second, sensory impairments may not directly lead to urgent problems of health or basic daily life, unless the impairment is severe. Compared to impairments in other domains, individuals with mild to moderate sensory impairments may tolerate or accustom themselves gradually and live independently without concurrently accumulated impairments in other systems for several years. As for nutrition screening, malnutrition risk is associated with the existing geriatric conditions, which are also associated with poor nutritional status [44]. Another study using multiple correspondence analysis on coexistence of geriatric conditions showed underweight was not significantly associated with the other conditions [43], although underweight status alone could not totally represent malnutrition. The nutrition screening items in the FIND-NEEDS were retrieved and modified from the core items of the commonly used screening tools in clinical practice, MUST and MNA-SF. The long-term impacts of the problems found by these domains needs to be followed up in future study. Nevertheless, from the viewpoint of intrinsic capacity and the 4Ms model, the domains of Nutrition, Eyes, and Ears in the FIND-NEEDS need to be retained for comprehensive assessment. Some adjustments of screening and management may be applied to these domains. For example, geriatric healthcare practitioners should evaluate the severity of poor vision or hearing ability and whether they have associated chronic illnesses or geriatric conditions. More specifically, when severe impairment of vision or hearing was detected, the questions need to link up with the concept of associated health problems or other conditions. Education to older adults and family about health literacy that hearing impairment, low physical activity, inadequate nutrition, and low social engagement are modifiable risk factors for cognitive impairment [45, 46], so that management of these problems is needed to prevent further decline of cognition.

The present study showed there were high percentages of older adults visiting geriatric clinics who had potential geriatric conditions, which would be ignored if no CGA was conducted. In fact, CGA was usually not considered by healthcare providers as routine assessment in primary geriatric care, because CGA is typically regarded as being carried out by geriatricians and/or trained gerontological nurses [5], and usually takes more than an hour to complete [3]. However, the FIND-NEEDS is easier for administration and can reduce the heavy workload in the geriatric setting. Completion of the FIND-NEEDS takes an average of less than 10 min, which is considerably less time than CGA. In addition to CGA, future research could be conducted to compare with other existing screening tools (e.g., ICOPE) to further determine the unique value and efficacy of FIND-NEEDS across different categories.

The time point in assessment for conducting FIND-NEEDS screening or CGA has not been clearly defined due to the difference in facilities and staff In fact, only a few older adults are given CGA evaluated because CGA takes a lot of time to administer. A previous quasi-experimental study reported only about 10% of admission patients in control group received CGA (usually administered to patients with frailty and recent functional decline) [4]. The FIND-NEEDS in the community or non-geriatric outpatient clinics can be used as a pre-visit questionnaire, or screening before CGA during hospitalization. Geriatric screening is suggested for all older adults visiting outpatient clinics, or inpatients hospitalized within first

48–72 h after admission [4], usually at a relatively stabilized condition of acute diseases, so that team staff have enough time to manage geriatric problems during a hospital stay. The FIND-NEEDS can be administered by the older adults themselves or their caregivers with assistance from research assistants, while CGA needs to be conducted by trained geriatric care professionals. Even though not totally stabilized conditions, such as those visiting the emergency room (ER), one study showed that a screening program for geriatric conditions during routine ER care increased the compliance of follow-up maintenance and did not result in negative attitudes toward the ER process among older patients [47].

There are some limitations in the present study. First, the sample was recruited using a convenience sampling method. Also, the sample was recruited in the geriatric clinics of a single center in Tainan City. Therefore, the representativeness of the present sample is restricted and cannot be generalized to the entire Taiwan elderly population. Future studies are therefore needed to examine if the FIND-NEEDS possesses good clinimetric properties in a more heterogeneous sample. Second, the sample size was not big enough to provide sufficient power for advanced clinimetric testing (e.g., confirmatory factor analysis). Future studies are needed to use other advanced clinimetric testing methods to corroborate the present study's conclusions. Third, the present study did not examine other clinimetric properties, such as inter-rater reliability, test-retest reliability, and responsiveness, it is unclear if the reproducibility and the ability to detect intervention effects of the FIND-NEEDS are satisfactory. Fourth, the FIND-NEEDS cannot be a substitute for CGA. Since the FIND-NEEDS is a simple screening tool to find out potential geriatric conditions with symptoms or influence on daily life, CGA must be conducted in advance to confirm the problems among older people with positive FIND-NEEDS findings, then appropriate geriatric care plan can then be made and implemented accordingly. Lastly, this study has not provided follow-up information on the outcomes after using FIND-NEEDS yet, future research might explore the potential long-term effects including the lasting impact of post-screening interventions.

In conclusion, our study showed that the newly developed questionnaire (i.e., FIND-NEEDS) is an easy-to-use screening instrument with acceptable clinimetric properties. Apart from its brevity which saves time for healthcare practitioners in busy clinical practice, the FIND-NEEDS has the strength of corresponding to the intrinsic capacity framework, DEEP-IN, and 4Ms model. With the theoretical background of geriatric assessment, the FIND-NEEDS can identify geriatric needs using the simple screening method. Healthcare providers can use the FIND-NEEDS to quickly screen overall conditions among older adults, and in-depth confirmation of the positive screening domains afterwards is suggested. Further follow-up on the outcomes, and comparison with other existing screening tools can then be conducted in the future.

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Statement of Ethics

The Ethical Committee for Human Research at the study hospital approved this study (B-ER-110-198). Written informed consent was obtained from participants or from their legal guardians if the patient had serious cognitive impairment.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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Author Contributions

Conception and design of study: C.M.C., F.W.H., Y.W.W., C.C.H., Y.T.L., C.Y.W., Y.F.C., C.C.K., and L.F.L.; acquisition of data: C.M.C., F.W.H., C.C.H., Y.T.L., and Y.C.Y.; analysis of data: C.M.C., Y.J.C., M.D.G., D.C.L., and C.Y.L.; drafting of article and/or critical revision: C.M.C., C.Y.W., Y.F.C., Y.J.C., M.D.G., D.C.L., and C.Y.L.; and final approval of manuscript: C.M.C., F.W.H., Y.W.W., C.C.H., Y.T.L., C.Y.W., Y.F.C., C.C.K., Y.J.C., M.D.G., D.C.L., and C.Y.L.

Data Availability Statement

All data generated or analyzed during this study are included in this paper. Further inquiries can be directed to the corresponding author.

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