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Laying the foundation for a Core Set of the International Classification of Functioning, Disability and Health for community-dwelling older adults in primary care: relevant categories of their functioning from the research perspective, a scoping review

Johanna Tomandl ,[1] Stefan Heinmüller,[1] Melissa Selb,[2] Elmar Graessel,[3] Ellen Freiberger ,[4] Thomas Kühlein,[1] Susann Hueber,[1] Stephanie Book ,[3] Susann Gotthardt[4]

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SB and SG contributed equally.

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For numbered affiliations see end of article.

Correspondence to
Ms Johanna Tomandl;
johanna.tomandl@gmail.com

ABSTRACT

Objectives The objective of this study was to find relevant concepts of functioning in community-dwelling older adults within frequently used assessment instruments published in the scientific literature. This was part of a larger project to develop an International Classification of Functioning, Disability and Health (ICF) Core Set for use in primary care.

Design A scoping review was conducted. Articles dealing with functioning in older adults were searched and assessed for eligibility. The study population included community-dwelling adults (≥75 years) without dementia, living in high-resource countries. Relevant concepts were extracted from assessment instruments and linked to the ICF using standardised linking rules. Finally, a frequency analysis was conducted.

Setting Home, primary care.

Participants Community-dwelling adults aged 75 years and above.

Results From 5060 identified publications, 68 were included and 30 assessment instruments extracted. Overall, 1182 concepts were retrieved. Most were linked to the 'activities and participation' component. The most frequently identified categories were 'memory functions', 'dressing' and 'changing basic body position'.

Conclusions This review provides a list of relevant ICF categories from the research perspective that will be used for developing an ICF Core Set for older primary care patients.

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Strengths and limitations of this study

- A broad literature search was performed in five key medical and social databases.
- This review encompassed a broad spectrum of studies, including mainly cross-sectional and longitudinal studies as well as randomised controlled trials, but also two qualitative and one mixed-method study.
- Restricting the search to articles published in English or German in specific high-resource countries and drawing a random sample for full-text screening carry the risk of losing potentially relevant publications.
- Excluding studies that focus solely on body structures may have introduced some bias in the results.

INTRODUCTION

The increasing average life expectancy is accompanied by an increasing prevalence of chronic diseases.[1 2] A blurring between the boundaries of diseases, risk factors and physiological ageing processes can be observed.[3 4] In general practices in Germany, the prevalence of multimorbidity in patients over the age of 60 years is around 85%.[5] Multimorbidity is a mostly disease-based concept, which is mainly being responded to pharmaceutically. The prevalence of polypharmacy in general practices in Germany is around 37%.[5] Inappropriate polypharmacy can lead to adverse drug events, increased risk for fractures, hospitalisation or even death.[6 7] To address this issue of inappropriate polypharmacy, there is a need for new strategies (eg, functioning information in the consultation) that consider the complexity of health in older adults. With increasing age,

problems in functioning become a strong predictor of mortality and provide important information about the consequences of chronic conditions.[8 9] Making aware of these functioning problems might help shift the medical gaze towards problems and answers more rooted in the patients' lived experience of health, ultimately helping to better balance medical decisions. As general practitioners are the primary contact for community-dwelling patients, they could play an important role in advancing the paradigm change from a disease-based to a biopsychosocial view.

Functioning can be defined as the outcome of interactions between a person's health conditions and contextual factors.[10] It can be described using the international standard and classification system for describing functioning and health, the International Classification of Functioning, Disability and Health (ICF). With more than 1400 categories, it is, however, too extensive to be used in daily practice. Thus, shorter lists of categories, so-called ICF Core Sets (ICF-CS), have been developed for several health conditions.[i] They comprise categories relevant to persons living with a specific condition.[11] An ICF-CS for geriatric patients in early post-acute rehabilitation was developed in 2005.[12] As target group and aims of rehabilitation can differ from that of general medicine, the categories included in this ICF-CS may likewise be different from an ICF-CS for geriatric patients in primary care. Two other ICF-CS, one for primary care and one for geriatric patients, have been developed in the Netherlands.[13–15] Though they might turn out to be applicable to our study population, they were developed using methods other than the established multiperspective methodology for developing ICF-CS, leaving out either the perspective of the target group or the researchers. For this reason, we aimed to develop an ICF-CS for community-dwelling adults (≥75 years) for use in primary care, following the standardised process of the ICF Research Branch.[11] This process includes a preparatory phase followed by a consensus conference. During the preparatory phase, four studies are conducted to identify relevant ICF categories: a systematic or scoping review (research perspective), a qualitative study (perspective of the target population),[16] an expert survey (experts' perspective) and an empirical study (clinical perspective).[17] To gain a comprehensive understanding of functioning, it is important to capture all four perspectives.

The scoping review reflects the research perspective in that it aims to identify aspects of functioning that are described or evaluated in the scientific literature related to the health condition of interest.[11] In this paper, methods and results of the scoping review are presented. The objective was to identify concepts of functioning in community-dwelling older adults considered relevant in frequently used assessment instruments published in the scientific literature.

[i]A list of accredited ICF-CS can be found here: https://www.icf-core-sets.org/en/page1.php.

METHODS

This scoping review was conducted following the methodology proposed by the ICF Research Branch.[11 ii] This methodology is composed of five steps: (1) literature search, (2) study selection, (3) extraction of relevant concepts, (4) linkage of the concepts to the ICF and (5) frequency analysis. We did not aim to answer clinical questions by reviewing existing evidence, but to systematically extract the concepts used by the scientific community to operationalise functioning related to community-dwelling older adults. A study protocol has been published elsewhere.[18] This review was registered in PROSPERO on 07 October 2017 and is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for scoping reviews guideline.[19]

Eligibility criteria

The selection of the eligibility criteria was guided by the PICOS (Population, Intervention, Comparison, Outcomes, Study design) framework.[20] Due to the special focus of this review, only the 'P', 'O' and 'S' were relevant for our search.

Population: For a publication to be included in this review, all the participants included in the published study had to be community-dwelling and at least 75 years old. Studies that included institutionalised participants (eg, nursing home), participants recruited in a hospital or rehabilitation centre, or participants with dementia were excluded. As the intended ICF-CS is meant to be used in primary care practices in Germany, only studies conducted in high-resource countries with a similar socioeconomic and cultural background were considered. Consequently, only studies conducted in the member states of the European Union and the European Free Trade Association, the USA, Australia and New Zealand were included. Moreover, to get a representative picture of the health reality of old adults, we excluded studies in which only participants suffering from one specific health condition were included, as these participants might have very specific needs that do not necessarily represent the needs of other community-dwelling older adults not suffering from the particular disease.

Outcomes: The publications had to be related to functioning as defined by the ICF (eg, activities of daily living, social interaction, physical mobility). Publications reporting on studies that solely focused on body structures without considering any other features of functioning were excluded. Since physicians tend to focus on physical aspects of health anyway, and the final ICF-CS is meant to complement this traditional emphasis on physical structures and processes with few categories as necessary (for reasons of feasibility), we decided to forego body structures to ensure that the resulting ICF-CS reflects

[ii]The ICF Research Branch is a cooperation partner within the WHO collaborating centre for the Family of International Classifications (WHO-FIC) in Germany, which aims to promote health by implementing ICF-based tools and models.

those components of the ICF that are not yet in the focus of general physicians.

Study design: As suggested in the ICF-CS development guidelines, randomised controlled trials, clinical controlled trials, cross-sectional studies, observational studies and qualitative studies were included.[11] Study protocols, case studies, economic evaluation studies, conference papers, psychometric studies, prevention studies, studies of phase-II clinical trials, studies exclusively showing laboratory parameters, animal experiments, letters, comments and editorials were excluded, as those publications usually do not include relevant information on functioning.[11] Furthermore, systematic reviews and meta-analyses were not included in this review.

Literature search

Electronic searches were carried out in PubMed, PsycINFO, EMBASE, CINAHL and Scopus to identify potentially relevant publications. The search terms were organised into population (eg, aged, elderly, older adults), living condition (eg, community-dwelling, independently living) and outcome variables according to the ICF-related terms (eg, social life, self-care, home environment) using the thesaurus of the respective database (eg, Medical Subject Headings in PubMed) as well as free-text words. Only studies published between 2007 and 2017 in peer-reviewed journals in English or German were considered for inclusion. The search strategy was reviewed by an experienced librarian. The whole search strategy is available in online supplemental appendix 1.

Study selection

The publications found in the databases were exported to a review manager (Covidence). After removing duplicates, five researchers (JT/SHe/SG/SB/EF) performed a title and abstract screening based on the predefined eligibility criteria. Title and abstract of each publication were screened by two researchers independently. As an overwhelming number of publications were identified for the full-text screening, a random sample was drawn to ensure manageability. As the purpose of this review was not to answer clinical questions by evaluating existing evidence, but only to systematically identify relevant concepts of functioning, drawing a random sample was possible. This procedure has already been applied in previous ICF-CS development projects[21–24] and is also recommended in the guidelines.[11] It was decided that a random sample, containing 50% of all publications, should be included for full-text screening. The random sample was drawn using the Random Integer Set Generator.[25] The full texts were screened by four independent researchers (one half by JT and SHe and the other half by SG and SB) based on the predefined inclusion and exclusion criteria. Results were compared and any disagreement was solved in discussion with all four researchers.

Assessment of study quality

As the purpose of this review was to systematically identify relevant concepts of functioning and not to assess the effectiveness of certain interventions, a quality assessment of the studies was considered unnecessary. Nevertheless, only studies that were published in peer-reviewed scientific journals were included for analysis. Thus, the publications have assumingly undergone a level of quality control.

Data extraction

Following the PICOS scheme, the following data were extracted from the publications:

- Population: age, gender, sample size, type of sample (eg, community-dwelling or residents of independent living facilities).
- Intervention (if applicable).
- Control (if applicable).
- Outcomes: concepts identified in instruments for assessing functioning.
- Study design.

Other data extracted were author, title, year and country. Following the methodology applied in other ICF-CS development projects, it was decided to focus on assessment instruments, as they provide a standardised and systematic basis for further analysis.[26–29] A concept was defined as a single health aspect or a personal (internal) or environmental (external) factor with an impact on health. Formally, a concept could consist of a single word or a set of words.[30] Examples for concepts are living arrangements, social embeddedness or walking. Assessment instruments were defined as any kind of standardised outcome measure (eg, questionnaires, clinical tests) used in the study. Disagreement between the two researchers regarding the extracted data was solved by discussion. When consensus between the two could not be reached, a third researcher was consulted.

Data synthesis

Assessment instruments that were not available in the respective publications were accessed either through the internet or by contacting the authors of the included publications. Following the method of other ICF-CS development projects, only assessment instruments used in at least two different studies were considered.[31 32] To give an overview of the identified assessment instruments, they were categorised according to their thematic focus based on the terminology used in the ICF. The items and response options of each assessment instrument were listed on one table. Subsequently, meaningful concepts contained within each item or response option were extracted. The concepts were linked to ICF categories by four independent researchers (one half by JT and SHe and the other half by SG and SB) using established linking rules.[33] Concepts that were too broad to be linked to one specific ICF category or a combination of ICF categories were coded as ‘not definable’ (nd), implying that the concept belongs to the universe of the ICF, but

a decision about the most precise ICF category could not be made.[33] Health conditions were coded as 'not covered-health condition' (nc-hc). To summarise the identified health conditions, they were grouped based on the structure of the International Classification of Diseases.[34] Concepts related to the 'particular background of an individual's life and living' (eg, life experiences) were linked to personal factors.[10] As there are no codes for these concepts in the ICF, they were coded as 'personal factors' (pf).[iii] When consensus between the two researchers was not reached, a third researcher was consulted. If an ICF category was assigned repeatedly in an assessment instrument, it was counted only once. However, when a publication reported on a study that used multiple instruments and a specific category was identified in more than one of these instruments, this particular category was counted according to the number of instruments to which it was linked. Therefore, the maximum count of one category can exceed the number of identified studies included in the review. We used descriptive statistics to report the most frequently identified ICF categories. Categories that were frequently identified are assumed to be particularly relevant from the researcher's perspective.[11]

Only first-level and second-level ICF categories are reported in this paper.[iv] If a concept was linked to a third-level or fourth-level ICF category, the overarching second-level category was included for analysis. Due to the hierarchical nature of the ICF, a lower-level category shares the attributes of the higher-level category of which it is a member.[10]

Patient and public involvement

Patients and the public were not involved in this study.

RESULTS

Study selection

A total of 10 043 publications were identified. After removing duplicates, 5060 potentially relevant publications were left. In the abstract screening, 681 articles were identified for full-text screening. Of these, a random sample of 341 articles (50%) was drawn for the full-text screening, from which 68 articles were subsequently included for data extraction (see figure 1). The references of the included studies are available in online supplemental appendix 2 and the study characteristics are provided in online supplemental appendix 3.

[iii]In the International Classification of Functioning, Disability and Health personal factors are defined as factors related to the individual (eg, age, gender, life experiences) whereas environmental factors cover all spects of the external world that have an impact on functioning (eg, social systems or laws).

[iv]The categories of the ICF are divided into different levels. First-level categories are coded using the component letter (b, s, d, or e) followed by the chapter number (one digit). Second-level categories are coded using the letter and three digits; the third-level and fourth-level categories using the letter and four or five digits.

Study characteristics

The 68 included studies were conducted in 16 different countries. Almost 20% of the studies were conducted in Finland (n=13), 14.7% in the USA (n=10) and 10.3% (n=7) in Sweden and Italy, respectively. The investigated study population consisted of 69 718 community-dwelling older adults, of whom 71.0% were women. One publication did not provide information about the gender of the participants. Most of the studies (72.3%) had an observational design (longitudinal or cross-sectional), 14.7% were intervention studies, 5.9% analysed secondary data, 5.6% were qualitative studies and one study (1.5%) used mixed methods.

Linking results

From the 68 included publications, 111 assessment instruments were identified. Out of these, 30 were identified in at least two of the publications and were included for data extraction (table 1).

The most frequently used assessment instrument was the Mini-Mental State Examination, which was reported in 25 articles (36.8%). From the selected assessment instruments, 1182 concepts were extracted. Out of these, 24 concepts were linked to first-level ICF categories, 1066 to second-level categories and 48 multidimensional concepts to two or more ICF categories. Forty-four concepts could not be assigned to a specific ICF category.

The 1066 concepts were assigned to 87 different second-level ICF categories (see table 2). Of these, 41 (47.1%) are related to 'activities and participation', 24 (27.6%) categories refer to 'body functions', 20 (23.0%) to 'environmental factors' and 2 (2.3%) belong to 'body structures'. Mentioned 53 times, the category *memory functions (b144)* was the most frequently identified category. Within the 'activities and participation' component, the category *dressing (d540)* and within the 'environmental factors' component, *products or substances for personal consumption (e110)* were identified most often. The two extracted ICF categories for 'body structures' were *structure of upper extremity (s730)* and *structure of lower extremity (s750)*. All 87 ICF categories will serve as candidates for consideration for inclusion in the final ICF-CS during the consensus conference.

The assigned first-level categories can be seen in table 3. Forty-eight extracted concepts were not linkable to only one ICF category. For these concepts, two or more categories were chosen for each concept (table 4).

Out of the 44 concepts, which could not be assigned to a specific ICF category, 30 (68.2%) were characterised as 'nd',[33] 9 (20.5%) referred to 'pf' and 5 (11.4%) were 'health conditions'. The 'nd' concepts included general health (n=14), physical health (n=5), physical activity (n=3), activities of daily living (n=3) and other (n=5). Concepts linked to 'pf' included living arrangements, self-sufficiency and medication adherence. The commonly reported health conditions were diseases of the skin and subcutaneous tissue, psychiatric disorders, neurological diseases, infectious diseases, diseases of the

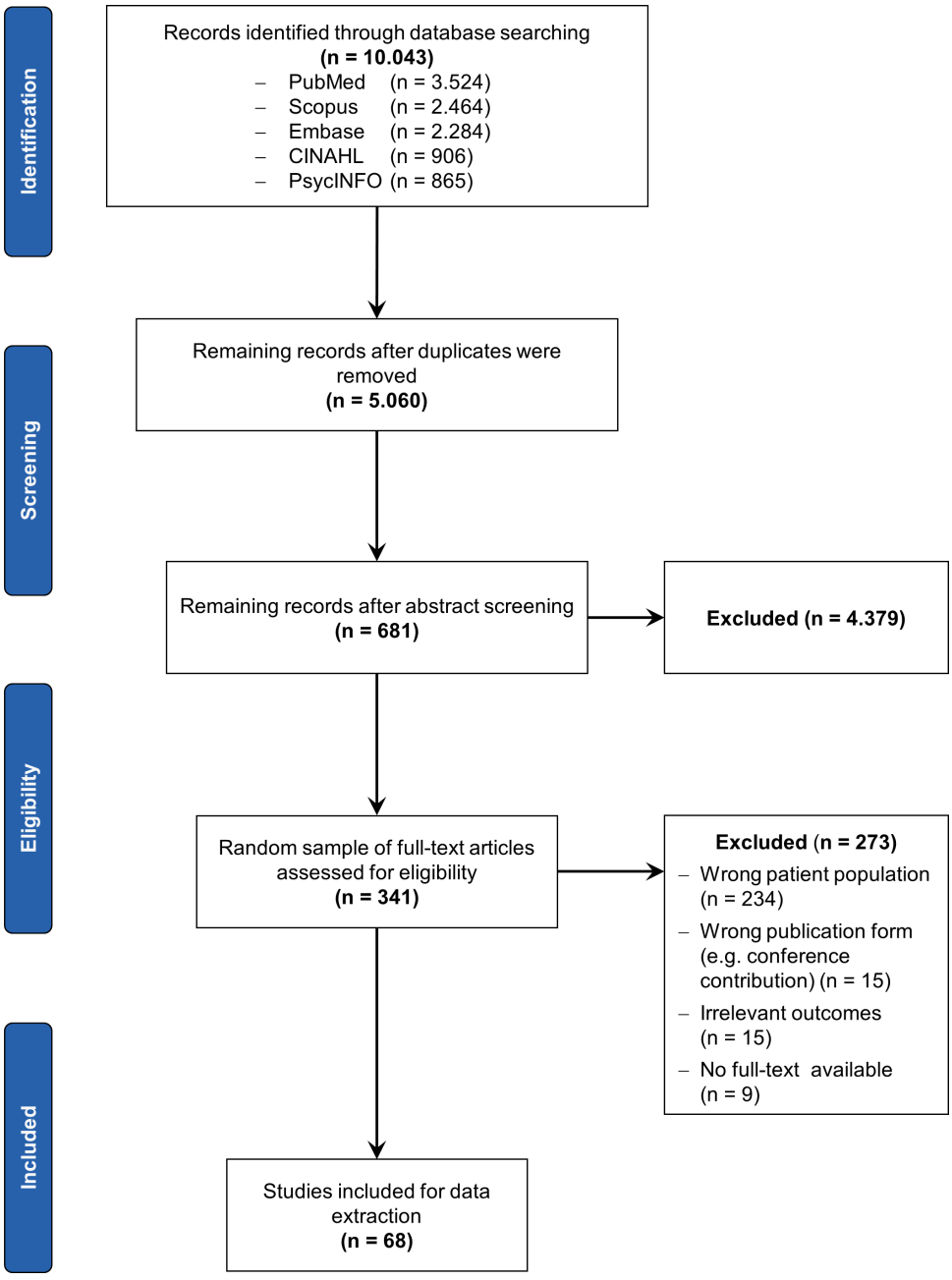

Figure 1 Preferred Reporting Items for Systematic Reviews and Meta-Analyses flow chart.

digestive system, sensory disorders, diseases of the musculoskeletal system and cancer.

DISCUSSION

As part of the project to develop an ICF-CS for community-dwelling adults ≥75 years old for use in primary care, this scoping review was performed to identify concepts of functioning that are considered relevant in frequently used assessment instruments published in the scientific literature. From this research perspective, the component 'activities and participation' has shown to be the most relevant among all ICF components with regard to functioning of older patients. Almost half of all assigned categories are in this component. ICF categories that belong to the components 'body functions' and 'environmental factors' were less frequently assigned. From the content of the assessment instruments, only four concepts were linked to two ICF categories of the component 'body structures'. Thus, this component was by far the least linked component. However, this might be due to the fact that studies which solely focused on body structures without considering any other features of functioning were excluded. As mentioned before, such studies were excluded to help ensure that the resulting ICF-CS goes beyond the biological aspects of health provision and promotes those components of the ICF that might not yet receive enough attention in primary care. It is noteworthy that the ICF-CS for primary care and for the

Table 1 Frequency of use and thematic focus of the included assessment instruments

Assessment instrument (study references: see online supplemental appendix 2)	No of studies	Cognition	Mobility	Functioning status	Environmental factors	Health conditions
Mini-Mental State Examination (1, 3, 4, 7, 8, 10, 15, 17,18, 23, 38, 39, 43, 44, 45, 47, 48, 49, 51, 54, 55, 56, 61, 62, 63)	25	x				
Geriatric Depression Scale-15 items (1, 7, 8, 23, 35, 43, 49, 50, 55, 61, 62, 65, 66)	13					x
Lawton Instrumental Activities of Daily Living Scale (5, 7, 12, 17, 18, 32,33, 34, 41, 43, 50, 58)	12			x		
Katz Index of Independence in Activities of Daily Living (8, 10, 32, 33, 34, 40, 41, 58, 67)	9			x		
Timed up and go (1, 5, 12, 14, 19, 28, 53)	7		x			
Short Physical Performance Battery (15, 23, 27, 30, 31, 36, 48)	7		x			
Activities of Daily Living staircase (20, 21, 22, 29, 35, 66)	6			x		
Short Form Health 36 (9, 14, 16, 19, 26)	5			x		
Geriatric Depression Scale-30 items (5, 23, 33, 34, 67)	5					x
Barthel Index of Activities of Daily Living (5, 12, 17, 18, 43)	5			x		
Center for Epidemiologic Studies Depression Scale (15, 27, 37, 40, 60)	5					x
The University of Alabama at Birmingham Study of Aging Life-Space Assessment (8, 15, 44, 59)	4				x	
EuroQoL-5 dimension (25, 41, 62, 63)	4			x		
Berg Balance Scale (1, 4, 21)	3		x			
Groningen Activity Restrictions Scale (54, 61, 62)	3			x		
Abbreviated Mental Test Score (32, 33, 34)	3	x				
Minimum Data Set-Home Care (30, 31, 36)	3	x	x	x	x	x
Mobility-Tiredness-Scale (384, 37, 63)	3					
Usability in my Home Questionnaire (29, 35, 66)	3				x	
Perceived environmental barriers to outdoor mobility (47, 48)	2				x	
Cognitive Performance Scale (30, 36)	2	x				
Functional Independence Measure (52, 53)	2		x	x		x

Continued

Table 1 Continued

Assessment instrument (study references: see online supplemental appendix 2)	No of studies	Cognition	Mobility	Functioning status	Environmental factors	Health conditions
Gait Speed (2, 12)	2		x			
Gijón Social Scale (12, 18)	2				x	
Housing Enabler Screening Tool (29, 35)	2				x	
Housing Options for Older People (35, 66)	2				x	
Impact on Participation and Autonomy Questionnaire (39, 47)	2		x	x	x	
Instrumental Activity Measure (52, 53)	2			x		
Mini Nutritional Assessment (17, 18)	2		x	x		x
Neuropsychological Aging Inventory (29, 57)	2			x	x	

The numbers in brackets refer to the studies (see online supplemental appendix 2), in which the instrument was used.

geriatric population developed by the research groups in the Netherlands also did not include body structures.[13–15]

The ICF chapters with the most frequently assigned categories were: b1 'mental functions', d4 'mobility', d5 'self-care' and d6 'domestic life'. These areas are of special interest as they are prerequisites for being able to live independently at home. In a meta-analysis, indicators of functional and cognitive impairments were identified as the strongest predictors for necessitating admission to a nursing home.[35] Cognitive impairment has also been identified as the strongest predictor for necessitating nursing home placement in a study investigating caregivers' reasons for nursing home placement.[36] Frequently identified categories referring to d5 'self-care' were *dressing (d540), washing oneself (d510), eating (d550)* and *toileting (d530)*. These are all activities of daily living. Literature indicates that older adults with problems in three or more activities of daily living had a higher risk of being admitted to a nursing home than adults without problems.[35] Household activities, like *doing housework (d640)* or *preparing meals (d630),* have frequently been identified in this review, but have not been found to be a major predictor for nursing home placement.[35] This might be due to the fact that impairments in these areas can easily be compensated, for example, with household aids or assistance from family members.

No concepts were identified referring to the chapter b4 'functions of the cardiovascular, haematological, immunological and respiratory systems'. This might be due to the fact that health conditions are coded with 'nc-hc' and not with the ICF category representing the underlying functions affected by a certain disease. Another explanation might be that, although the prevalence of diseases in these systems, especially of cardiovascular diseases, has increased since the 1980s, inability to perform activities of daily living as well as mortality induced by these diseases has decreased in the same period.[2] This might be an explanation why recent research that focuses on functioning of older adults, as reflected by the publications from 2007 to 2017, is less concerned with functions of the cardiovascular, haematological, immunological and respiratory systems. Moreover, no concepts were identified in the chapter e4 'attitudes'. Attitudes may be more in the focus of qualitative research, which, due to the focus of this review on assessment instruments, did barely show up. However, as several studies and systematic reviews suggest that negative attitudes towards old age negatively affect the health of the older persons, attitudes might be a relevant aspect to also include in instruments used for assessing functioning.[37–39]

Concepts referring to environmental factors with an impact on an individual's life were minimally addressed in the assessment instruments reported in the included articles. The most frequently identified category in this section was *products or substances for personal consumption (e110),* mainly assigned for the concept of medication. However, environmental factors like housing design (eg, lighting conditions, uneven surfaces), neighbourhood planning (eg, public transportation, walkable community services) and social support (eg, family, friends or health professionals) play a crucial role in old age. Considering these environmental factors can contribute to the prevention of falls, nursing home placement as well as to the compensation of other negative effects of age-related

Table 2 Frequency of second-level ICF categories linked to concepts identified in the assessment instruments

ICF code	ICF category	Count
Activities and participation		612
d177	Making decisions	9
d166	Reading	2
d170	Writing	2
d210	Undertaking a single task	28
d230	Carrying out daily routine	9
d240	Handling stress and other psychological demands	7
d360	Using communication devices and techniques	17
d410	Changing basic body position	39
d450	Walking	36
d470	Using transportation	25
d455	Moving around	24
d460	Moving around in different locations	21
d475	Driving	17
d420	Transferring oneself	15
d430	Lifting and carrying objects	8
d445	Hand and arm use	5
d415	Maintaining a body position	3
d465	Moving around using equipment	2
d540	Dressing	41
d510	Washing oneself	39
d550	Eating	36
d530	Toileting	30
d520	Caring for body parts	13
d560	Drinking	11
d570	Looking after one's health	5
d640	Doing housework	37
d630	Preparing meals	28
d620	Acquisition of goods and service	28
d650	Caring for household objects	6
d660	Assisting others	2
d750	Informal social relationships	4
d710	Basic interpersonal interactions	2
d720	Complex interpersonal interactions	2
d760	Family relationships	2
d770	Intimate relationships	2
d870	Economic self-sufficiency	17
d850	Remunerative employment	7
d860	Basic economic transactions	2
d920	Recreation and leisure	19
d910	Community life	5
d930	Religion and spirituality	5
Body functions		359
b144	Memory functions	53
b114	Orientation functions	35

Continued

Table 2 Continued

ICF code	ICF category	Count
b140	Attention functions	35
b152	Emotional functions	35
b167	Mental functions of language	30
b130	Energy and drive functions	28
b126	Temperament and personality functions	23
b110	Consciousness functions	5
b134	Sleep functions	5
b160	Thought functions	5
b147	Psychomotor functions	3
b172	Calculation functions	3
b280	Sensation of pain	12
b210	Seeing functions	3
b230	Hearing functions	3
b330	Fluency and rhythm of speech functions	5
b525	Defecation functions	19
b510	Ingestion functions	3
b530	Weight maintenance functions	3
b620	Urination functions	25
b755	Involuntary movement reaction functions	13
b730	Muscle power functions	7
b810	Protective functions of the skin	3
b820	Repair functions of the skin	3
Body structures		4
s750	Structure of lower extremity	2
s730	Structure of upper extremity	2
Environmental factors		91
e110	Products or substances for personal consumption	17
e155	Design, construction and building products and technology of buildings for private use	12
e115	Products and technology for personal use in daily living	5
e120	Products and technology for personal indoor and outdoor mobility and transportation	4
e125	Products and technology for communication	2
e160	Products and technology of land development	2
e165	Assets	2
e210	Physical geography	2
e225	Climate	2
e240	Light	2
e250	Sound	2
e310	Immediate family	5
e315	Extended family	5
e320	Friends	5
e325	Acquaintances, peers colleagues, neighbours and community members	5
e355	Health professionals	3
e575	General social support services, systems and policies	5
e580	Health services, systems and policies	5
e530	Utilities services, systems and policies	4

Continued

Table 2 Continued

ICF code	ICF category	Count
e520	Open space planning services, systems and policies	2
e530	Utilities services, systems and policies	4
e520	Open space planning services, systems and policies	2

Note: d: activities and participation, b: body functions, s: body structures, e: environmental factors.
ICF, International Classification of Functioning, Disability and Health.

declines.[35 40–42] Thus, developing instruments that address these essential environmental factors or revising current assessment instruments to include more environmental factors items may be warranted.

Strengths and limitations

There are several strengths and limitations of this scoping review. A broad literature review was performed using a systematic search strategy in five key medical and social databases. This review encompassed a broad spectrum of studies, including cross-sectional and longitudinal studies as well as randomised controlled trials. However, due to the focus on assessment instruments, qualitative studies, which have the potential to analyse participants' feelings, opinions and experiences in depth, are underrepresented in this study.

Another limitation of this literature review is the restriction to articles published in English or German. Thus, relevant studies conducted in the selected countries, but published in the authors' native language were possibly missed. Also drawing a random sample for full-text screening carries the risk of losing potentially relevant publications. Finally, excluding studies that focus solely on body structures may have introduced some bias in the results. The reason for excluding these studies was mentioned above.

Some potentially relevant information may have been lost in the linking process, as single ICF categories are often not precise enough to represent some relevant concepts for older adults. For example, fatigue, falls or fear of falling could not easily be linked to one specific ICF category. Sometimes more than one category was necessary and still the concept might not be adequately described; for example, fear of falling was linked using *involuntary movement reaction functions (b755)*, *sensation of falling (b2402)* and *emotional functions (b152)*. Other concepts could only be linked to the very general first-level ICF categories, not allowing a detailed representation of the concept; for example, isolation was linked to s*upport and relationships (e3)*. Sometimes, the same concept could be linked to different categories. This was especially the case for concepts regarding the change of body positions. For example, the concept 'get into bed' can be linked to:

- *Lying down (d4100);* defined as 'Getting into and out of a lying down position or changing body position from horizontal to any other position, such as standing up or sitting down'.[10]
- *Standing (d4104);* defined as 'Getting into and out of a standing position or changing body position from standing to any other position, such as lying down or sitting down'.[10]

This was one reason why we decided to link all concepts to second-level categories only. Being aware of these issues, the WHO created a mechanism of updating ICF categories to further enhance the use of this classification.[43] We will report the linking problems we faced to the WHO after publication of this study.

Table 3 Frequency of first-level ICF categories linked to concepts identified in the assessment instruments

ICF codes	ICF category	Count
e3	Support and relationships	9
d7	Interpersonal interactions and relationships	5
d3	Communication	2
d4	Mobility	2
d5	Self-care	2
d6	Domestic life	2
d8	Major life areas	2

Note:. e: environmental factors, d: activities and participation.
ICF, International Classification of Functioning, Disability and Health.

Table 4 Frequency of combinations of ICF categories linked to concepts identified in the assessment instruments

ICF codes	Description	Count
b152, b1266	Feeling worthless	18
b130, b1264	Openness for new experiences	18
b1470, d720, b1521	Changes in behaviour symptoms	3
b152, b130	Indicators of depression, anxiety, sad mood	3
b1641, d230, d177	Cognitive skills for daily decision-making	3
b755, b2402, b152	Fear of falling	3

Note: b: body functions, d: activities and participation.
ICF, International Classification of Functioning, Disability and Health.

Implications for practice

Within a consensus conference a comprehensive ICF-CS based on the results of this scoping review and the three other preparatory studies, and also considering the already existing ICF-CS for this target group mentioned in the introduction, will be developed.

As discussed, several aspects of functioning that were identified in this review are closely linked to independent living. There is some evidence that older patients tend to consider problems in functioning that threaten their independent living as most important, whereas their physicians focus more on somatic problems and risk factors.[44] Thus, in order to better balance medical interventions according to the older patients' needs, it might be warranted to include more psychosocial and environmental information in the consultation process.[45] Defining those aspects of functioning that are relevant from the research perspective seems important to us, because assessment instruments that are frequently used influence whether an intervention is seen to be effective or not. The concepts found therefore will have a strong influence on the final ICF-CS to be developed.

CONCLUSIONS

In conclusion, this scoping review demonstrates that frequently used instruments for assessing functioning in older adults focus mainly on activities of daily living and mental functions, whereas environmental factors are only minimally addressed. Despite some limitations experienced in the linking process, the ICF provides a useful reference to identify and cluster the concepts used in assessment instruments focusing on functioning in community-dwelling older adults.

Author affiliations
[1]Institute of General Practice, Friedrich-Alexander University Erlangen-Nuremberg, Erlangen, Germany
[2]ICF Research Branch, a cooperation partner within the WHO Collaborating Center for the Family of International Classifications in Germany (at DIMDI), SwissParaplegic Research, Nottwil, Switzerland
[3]Department of Psychiatry and Psychotherapy, Center for Health Services Research in Medicine, Friedrich-Alexander University Erlangen-Nuremberg, Erlangen, Germany
[4]Institute for Biomedicine of Aging, Friedrich-Alexander University Erlangen-Nuremberg, Nuremberg, Germany

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Contributors JT was involved in the development of the search strategy; performed the literature search; took part in the screening of the papers, the data extraction and the linking process; performed the data analysis; was involved in the interpretation of the data; drafted parts of the manuscript and collated all sections from the coauthors. SH was involved in the development of the search strategy, the screening of the papers, the data extraction, the linking process and the interpretation of the data. MS advised the research team on the ICF Core Set methodology and revised the draft. EF was involved in the conception of the study, the development of the search strategy and the abstract screening; provided supervision and revised the draft. EG/TK/SHu were involved in the conception of the study and in the development of the search strategy; provided supervision and revised the draft. SB/SG were involved in the development of the search strategy, the screening of the papers, the data extraction, the linking process and the interpretation of the data; and drafted parts of the manuscript. All authors read and approved the final version of the manuscript. SB and SG contributed equally to this work.

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ORCID iDs
Johanna Tomandl http://orcid.org/0000-0001-5571-421X
Ellen Freiberger http://orcid.org/0000-0002-6506-6276
Stephanie Book http://orcid.org/0000-0002-7120-4022

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