

Functioning in patients with schizophrenia: A systematic review of the literature using  
the International Classification of Functioning, Disability and Health (ICF) as a  
reference

Running head: Functioning in schizophrenia

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## **Compliance with ethical standards**

### *Disclosure of potential conflicts of interest*

The authors declare that they have no conflict of interest.

### *Research involving Human Participants and/or Animals*

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

### *Informed consent*

Not applicable.

## **Abstract**

**Purpose:** To identify and quantify the main concepts included in published studies focusing on individuals with schizophrenia using the International Classification of Functioning, Disability and Health (ICF).

**Methods:** Searches (limited to those published from 2008 to 2012) were performed in Medline, PsycINFO and CINAHL. Included studies described participants with schizophrenia, were original articles, and included only subjects who were at least 18 years of age at study entry. All concepts underlying the measures and the text of the articles were extracted, and they were linked to ICF categories using standardized rules.

**Results:** From the 3,584 abstracts retrieved, 348 were randomly selected, and of these, 206 studies met the inclusion criteria. A total of 17,141 concepts were extracted, 84.8% of which could be linked to 491 ICF categories: 222 (45.21%) of the categories referred to Body Functions, 29 (5.91%) to Body Structures, 186 (37.88%) to Activities and Participation and 54 (11%) to Environmental Factors. Seventy second-level categories were reported in at least 5% of all studies: 30 of these categories referred to Body Functions, 2 to Body Structures, 34 to Activities and Participation and 4 to Environmental Factors.

**Conclusion:** The study has allowed us to identify and quantify the main concepts included in studies focusing on people with schizophrenia using the ICF. The majority of the concepts refer to Body Functions and Activities and Participation, rather than to Body Structures and Environmental Factors.

**Key words:** schizophrenia, quality of life, ICF, functioning, disability

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**Introduction**

Schizophrenia is a chronic and relapsing disorder characterized by positive and negative symptoms, variable social and cognitive impairment, disorganization, a high prevalence of substance use disorders, and increased mortality [1]. In fact, it is ranked among the top 20 most disabling diseases, with a prevalence of 26.3 million people worldwide [2].

Diminished functioning and low health-related quality of life (HRQOL) have consistently been reported as being associated with schizophrenia [3, 4, 5]. More specifically, both functioning and HRQOL are affected by negative symptoms and by the side effects of some antipsychotics, among other factors [3, 6]. Before proceeding, it will be helpful to clarify our use of these terms in this article, since although functioning and HRQOL are not synonymous, they are certainly related. Thus, whereas functioning and disability reflect the objective perspective of health and health-related domains, HRQOL can be defined as an individual's perceptions of these domains [7]. Hence, from an objective perspective, functioning can be classified into meaningful and discrete elements or categories, and these same categories may serve as the starting point for the operationalization and, therefore, the assessment of people's subjective experience [7]. Consequently, an in-depth understanding of the outcome domains that have been addressed in studies of schizophrenia would help to better assess the impact of this disorder on individuals' functioning and HRQOL. In this regard, Bromley and Brekke [8] have suggested that assessing the functioning of persons with schizophrenia

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is crucial for a better understanding of the course of the disease, the potential impact of treatment and the rehabilitation outcomes.

The International Classification of Functioning, Disability and Health (ICF [9]) provides a comprehensive and universally accepted framework to classify and describe functioning, disability and health in people with all kinds of diseases” [10, p. 306]. It is structured hierarchically in chapters and categories of different levels, and functioning is described based on four components: *Body Functions, Body Structures, Activities and Participation* and *Environmental Factors*. An example from the component Body Structures is as follows: s1: Structures of the nervous system (1<sup>st</sup> level); s110 Structure of brain (2<sup>nd</sup> level); s1100: Structure of cortical lobes (3<sup>rd</sup> level); s11000: Frontal lobe (4<sup>th</sup> level).

The ICF is a comprehensive classification containing more than 1400 categories. However, the large number of categories poses a major challenge in terms of practicability and feasibility, and not all the categories will be relevant to each specific health condition. Thus, in order to enhance the applicability of the classification and tailor it to the needs of users, ICF Core Sets (ICF-CSs) have been proposed for several health conditions [11]. These ICF-CSs cover the most relevant categories for a specific health condition and allow both clinicians and researchers to classify and describe functioning using an international and common terminology [12]. There are comprehensive and brief versions of the ICF-CSs. The Comprehensive ICF-CS for a specific health condition includes as few categories as possible to be practical, but as many as necessary to be sufficiently comprehensive when seeking to describe the typical spectrum of problems in functioning and in the environment of individuals with that condition. The Brief ICF-CS is a shorter list of ICF categories derived from the Comprehensive ICF-CS for the same condition. The categories selected are those

considered to be essential for describing the typical spectrum of limitations in functioning and in the environment of affected individuals, while at the same time being few enough in number to be practical in clinical studies or trials [13]. For clinical practice and research, ICF-CSs may serve as a practical tool that covers the entire spectrum of functioning of persons with a specific health condition, and they can be used in documenting, reporting and assessing the impact of that health condition on a person's lived experience worldwide [11, 14].

Under the methodology endorsed by the WHO [11] for developing an ICF-CS a number of perspectives need to be gathered and integrated into the development process, which can be divided into a preparatory phase and a consensus conference. The aim of the preparatory phase is to consider the perspectives of patients (see, for example [15, 16]), health professionals (for example [17, 18]), experts (for example [19, 20]) and researchers (for example [21, 22, 23]), and to identify the aspects of functioning and health that they each believe to be relevant. Since ICF-CSs are designed to be used in both clinical and research settings, it is important to ensure that both these perspectives have been taken into account in the development process. One way of ascertaining the views of researchers and the topics that are relevant to their work is to systematically review the outcomes that are measured and reported in research on a given health condition. In order to do this within the framework of the ICF, one must first identify the concepts reported in published studies, link these concepts to the ICF and analyse quantitatively the ICF categories.

In the case of schizophrenia, the ICF-CS development project began in 2013 as a collaboration between the University of Barcelona and the ICF Research Branch, a cooperation partner within the WHO Collaborating Centre for the Family of International Classifications. The preparatory phase was conducted between 2013 and

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2015. The current study presents the results from the systematic literature review, which enabled us 1) to identify the aspects of functioning in schizophrenia which have been mostly widely examined in the scientific literature, and to detect those which have been neglected or less widely studied, and 2) to incorporate the research perspective into the process of developing the ICF-CS for schizophrenia, thus providing a complement to the perspectives of patients, health professionals and experts. The availability of the ICF-CS for schizophrenia based on a widely accepted terminology will help to support clinical practice, for instance, in planning interventions or defining rehabilitation goals and patient care, and will also contribute to health reporting and research.

In light of the above, the aims of this systematic review were 1) to identify relevant outcomes reported in published studies of individuals with schizophrenia, and 2) using the ICF as a conceptual framework, to identify and quantify the concepts addressed in these outcome variables.

## **Methods**

The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines were followed in reporting this systematic review [24].

### **Study design**

The systematic review involved three steps. First, studies were selected from different electronic databases. Second, concepts present in the measures and in the full text were extracted from the included studies. Finally, the concepts underlying the outcome variables were linked to the corresponding ICF categories. All three steps were carried out by two independent reviewers in accordance with the methodology that has been developed and implemented for these purposes by the ICF Research Branch, Nottwil, Switzerland ([www.icf-research-branch.org](http://www.icf-research-branch.org)), a cooperation partner within the WHO

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Collaborating Centre for the Family of International Classifications in Germany (at the German Institute of Medical Documentation and Information),.

### *Search strategy and inclusion criteria (Step 1)*

We conducted electronic searches of MEDLINE, PsycINFO and the Cumulative Index to Nursing and Allied Health Literature (CINAHL) for the period 2008 to 2012, using the following search terms and strategy: schizophren\* AND (function\* OR disab\*) located in the Title, Abstract or Keywords fields. All searches were limited to English-language, peer-reviewed articles referring to studies conducted with human participants. Due to the very large number of abstracts retrieved by the search, only a random sample of these was ultimately checked for inclusion. Assuming a finite population, simple random sampling was performed. Sample size was defined according to the primary binary outcome variable (sample error 5%; confidence level 95%;  $p = q = .5$ ).

The eligibility criteria applied when checking these abstracts were as follows: (1) describing participants with schizophrenia, and excluding studies with first-episode psychosis patients and post-mortem studies; (2) original journal articles (randomized controlled trials, randomized clinical trials, controlled clinical trials, cross-sectional studies, longitudinal observational studies, qualitative studies, and case reports), and excluding meta-analysis, reviews, psychometric studies, preventive studies (healthy study population), studies of phase-II clinical trials and studies with exclusive laboratory parameters; and (3) including only subjects who are at least 18 years of age at study entry, and excluding studies of children and adolescents.

### *Data extraction procedure (Step 2)*

Two psychologists specialized in schizophrenia independently extracted the underlying concepts present in the measures (standardized questionnaires) and the full text of each



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article; they also recorded the most relevant characteristics of the selected studies. In the event that an article did not specify the items of a given questionnaire, we sought to obtain this information either by checking the original references for the instrument or through internet searches.

Study characteristics such as study type (observational, intervention, other), sample size (<10, 10-50, 51-100, >100), type of diagnosis (schizophrenia alone, schizophrenia spectrum disorders [e.g. schizoaffective or schizophreniform disorders], concomitant pathologies), diagnostic criteria used, type of sample (inpatient, outpatient, mixed), time in years since diagnosis, number of patients, age range and mean age of patients, and gender of sample (male, female, mixed) and percentage of males were documented.

After identifying the underlying concepts, the two researchers compared their results and resolved any disagreement by discussion.

### *Linking to the ICF (Step 3)*

The identified concepts were then linked to the most specific ICF category, this being done separately by two trained researchers with experience of the ICF and in accordance with linking rules developed for this purpose [25] (see Table 1 for examples). For standardized questionnaires, the same linking rules were used to link the concepts present in the extracted items to the ICF. The ICF categories obtained by the two independent researchers were then compared, and in the event of disagreement a consensus was reached by discussion. The inter-rater reliability between the two researchers, based on the overall percentage of agreement, was also calculated. The value obtained was .80 (95% CI .79-.81). When the information provided by a concept was not sufficient for making a decision about an ICF category, it was linked using the code “not definable (nd)”. If a concept did not appear in the ICF but was clearly a

personal factor as defined in the ICF<sup>1</sup>, it was coded as “personal factor” (pf). When a concept was not represented by the ICF categories, it was coded as “not covered” (nc). Finally, when a concept referred to a diagnosis or a health condition it was coded as “health condition” (hc) [26]. Examples of the coding of concepts are as follows: “level of functioning” was coded as “nd\_functioning”, “age at onset” was coded as “pf\_age at onset”, “suicide attempt” was coded as “nc\_suicide”, and “schizophrenia diagnosis” was coded as “hc\_schizophrenia”.

Insert Table 1 about here

## Data analysis

Absolute and relative frequencies of the ICF categories linked to the identified concepts were calculated, relative to the total number of studies. Given that we used a random sample of all the articles identified in the literature search, we report the 95% confidence intervals of these percentages. In order to avoid bias, any ICF category that was assigned repeatedly in a given study was counted only once. Only ICF categories with a frequency equal to or greater than 5% were reported. ICF categories are presented at the first and second level. “If a concept was linked to a third- or fourth-level category, the corresponding second-level category was reported, as lower-level categories share the attributes of the higher-level category” [23, p. 809]. For example, “Control of thought” (b1603) is reported as the second-level category “Thought functions” (b160).

## Results

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<sup>1</sup> Personal factors refer to the particular background of an individual’s life and circumstances and comprise features of the individual that are not part of a health condition or health states (e.g. gender, race, age, other health conditions, fitness, lifestyle, habits, etc.) [9].

In the first step 3,584 studies were located using the electronic search strategy. Of these, 348 were randomly selected and 206 met the inclusion criteria for final selection.

Therefore, the full text of those 206 articles was assessed (See Appendix 1 for the full list of included papers). The selection process is illustrated in Figure 1. The most frequent exclusion criteria were that the participants were not patients with schizophrenia (57% of excluded studies) or that they were first-episode psychosis patients (21.5% of excluded studies).

Insert Figure 1 about here

Most studies had an observational design (79.6%) and the majority of them had been conducted with outpatients (31.1%). The main diagnosis was schizophrenia alone (66.0%), and diagnoses were mostly based (77.2%) on criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM). The time since diagnosis ranged from 6 months to 41 years (*Median* = 12 years; *Interquartile Range [IQR]* = 9-15 years). The number of participants ranged from 1 to 5134 (*Median* = 50; *IQR* = 21-113). Mean age ranged from 19 to 67.7 years (*Median* = 36.3; *IQR* = 32.58-41) and the percentage of males ranged from 0 to 100% (*Median* = 63.58; *IQR* = 53.11-73.20%). The study characteristics are shown in Table 2.

Insert Table 2 about here

A total of 17,141 concepts were identified in the 206 studies. Of these, 10,785 concepts (62.9%) were identified in the measurement instruments used in the studies. The instruments most frequently used were the Positive and Negative Syndrome Scale (PANSS [27]) (used in 55.8% of the articles), the Wechsler Adult Intelligence Scale (WAIS [28]) (used in 20.9% of the articles) and the Wisconsin Card Sorting Test (WCST [29]) (used in 15% of the articles). Eight hundred and fourteen concepts (4.7%)

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were considered as not definable, 448 concepts (2.6%) as personal factor, 440 concepts (2.6%) as not covered and 901 concepts (5.3%) as health condition. The remaining 14,538 concepts (84.8%) were able to be linked to a total of 491 ICF categories. These concepts were linked to 182 second-level ICF categories (37.1%), 286 third-level ICF categories (58.2%) and 23 fourth-level ICF categories (4.7%).

Table 3 shows the first-level categories that were addressed in at least 5% of all studies. This includes 7 out of 8 Body Functions chapters, 2 out of 7 Body Structures chapters, all 9 Activities and Participation chapters and 3 out of 5 Environmental Factors chapters.

Aggregating the second-, third- and fourth-level categories at the second level yielded 202 different second-level categories: 74 out of 114 (64.9%) were linked to Body Functions categories, 15 out of 56 (26.8%) to Body Structures categories, 83 out of 118 (70.3%) to Activities and Participation categories and 30 out of 74 (40.5%) to Environmental Factors categories. A total of 70 second-level categories reflected concepts measured in at least 5% of all studies.

The most commonly found second-level categories of the Body Functions component were b160 Thought functions, b156 Perceptual functions, b164 Higher-level cognitive functions, b152 Emotional functions, b147 Psychomotor functions, b130 Energy and drive functions, b126 Temperament and personality functions, b140 Attention functions and b765 Involuntary movement functions (Table 4). Body Structures categories were less frequent, and only s110 Structure of brain and s320 Structure of mouth were found in at least 5% of all studies (Table 5). With respect to the Activities and Participation component, the most often found categories were d720 Complex interpersonal interactions, d710 Basic interpersonal interactions, d160 Focusing attention, and d163

Thinking (Table 6). Finally, e110 Products or substances for personal consumption was the most often found category in the Environmental Factors component (Table 7).

Insert Tables 3, 4, 5, 6 and 7 about here

## **Discussion**

The present study has allowed us to identify and quantify issues commonly addressed in published studies focusing on functioning and disability in persons suffering from schizophrenia. More specifically, having extracted and linked all the concepts underlying the outcomes reported in a representative sample of 206 studies, we are able to offer a comprehensive and systematic overview of the concepts included in schizophrenia research. In contrast to some other systematic reviews that have been centred on randomized controlled trials or on standardized health status instruments (i.e. [30,31]), the present review considered other types of designs, such as observational studies, as well as studies that administered non-standardized instruments.

In the framework of the ICF, other systematic reviews have focused on mental health disorders, namely depression [32, 33], schizophrenia [34] and bipolar disorder [22]. The first of these reviews only included randomized controlled trials, while the latter also included observational studies. The percentage of single target diagnosis in the systematic review of bipolar disorder was 47% (40% type I and 7% type II bipolar disorder), while the corresponding figures in reviews of depressive disorder were 90% (87% major depression and 3% dysthymic disorder) [32] and 93% (83% major depression, 3% minor depression and 7% depressive episode) [33]. In the present study the percentage of single diagnosis was 96% (66% schizophrenia and 30% other schizophrenia spectrum disorders).

Most of the reviewed studies used standardized measurement tools for the assessment of functioning. The three most commonly used standardized tools were the PANSS [27], which typically assesses severity of positive and negative symptomatology, the WAIS [28], which assesses a wide variety of cognitive functions such as verbal comprehension or processing speed, and the WCST [29]), which assesses executive functions. This is a noteworthy finding given that the most relevant concepts extracted from the literature on schizophrenia are those referring to the Body Functions component, some of which are covered by these three assessment instruments. However, for several categories identified by the literature review, there are no generic or condition-specific assessment instruments in schizophrenia. Moreover, although a range of instruments are currently available for assessing the functioning of persons with schizophrenia, none of them seems able to provide a comprehensive assessment or offer the degree of specificity required for an optimal assessment of this kind [35, 36]. Thus, the development of future tools could benefit from the identification of a standardized set of commonly affected domains of functioning and disability in schizophrenia. We consider that it is possible to adopt a defined list of ICF categories in order to better describe the psychopathology and disabilities associated with schizophrenia. A first step in this regard would involve developing an ICF-CS for schizophrenia, taking into account four complementary perspectives, those of clinicians, researchers, patients and caregivers, and experts. This systematic review shows, from the research perspective, which ICF categories are important regarding the functioning of patients with schizophrenia. As such, the present study constitutes a step forward in the development of an ICF-CS for schizophrenia because it helps to identify the ICF categories that, from the perspective of researchers, would be most relevant to include. This ICF-CS would provide a platform from which to create specific instruments that could offer a more detailed

description of these patients' functioning and which would help to better assess the impact of schizophrenia on their HRQOL. Previous studies have demonstrated the usefulness of the ICF categories for the comparison and in-depth analysis of generic and condition-specific HRQOL instruments [26, 37, 38, 39], as well as for operationalizing HRQOL based on the ICF concept of functioning, which integrates health and health-related aspects [7]. We believe that the biopsychosocial model of the ICF framework provides an excellent platform from which to design and carry out studies on HRQOL in patients with schizophrenia, in line with what has already been done for other health conditions [40].

It should be pointed out that a large percentage of concepts could be linked to the ICF (85%); this proportion is similar to the one encountered in the systematic review of depression (89%) and higher than in the case of bipolar disorder (73%). However, some concepts were not linkable to the ICF system. In some cases, the information provided in a concept was not sufficient for making a decision about an ICF category, such as "level of functioning" or "side effects". Other concepts referred to a personal factor such as "age at onset" or "premorbid IQ", factors that seem to be related to the course of the illness [41] and, thus, to the functioning and disability of patients with schizophrenia. Another small proportion of concepts were linked to health conditions, for example, schizophrenia, depression, head trauma, neurological disorder and substance use disorder. These concepts came from the inclusion and exclusion criteria specified in the corresponding studies. Finally, and as was also found in the systematic review of bipolar disorder research [22], in a few cases the coders felt that additional codes not currently included in the classification system would be needed to capture fully the experience of living with schizophrenia; examples here would be "illness duration" or "suicide". More intense debate is needed in order to decide whether or not

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such specifications should be included, especially in relation to mental health disorders, where these types of features are probably more prominent [42].

The high number of second-level ICF categories ( $n = 202$ ) found in this systematic review illustrates the different kinds of difficulties in functioning and disability that are faced by patients with schizophrenia. However, it should be pointed out that only 70 categories appeared in at least 5% of the studies. Most of them ( $n = 34$ , 48.6%) refer to the Activities and Participation component and are related to the quality of life of the patients. A wide variety of domains included in this component (d1 Learning and applying knowledge, d5 Self-care, d7 Interpersonal interactions and relationships and d8 Major life areas) have frequently been identified as relevant areas of study in this population. This finding is consistent with the fact that the major areas of everyday functioning that prove problematic for patients with schizophrenia are related to interacting with people in a contextually and socially appropriate manner, employment, leisure and self-care [41, 43, 44, 45, 46]. According to the literature a significant proportion of persons with schizophrenia are unable to fulfil basic social roles, to carry out any kind of job or to study [41, 45]. In addition, fewer than 30% of persons with schizophrenia work regularly and most of them are underemployed when compared with their premorbid employment level [44]. Moreover, one in five persons with schizophrenia has a problem with self-care (e.g. washing themselves) and performing household duties (e.g. keeping their home tidy) [45].

Specifically, our results showed that second-level ICF categories such as d845 Acquiring, keeping and terminating a job, d920 Recreation and leisure, d510 Washing oneself and d570 Looking after one's health were some of the frequent categories highlighted by the research literature for this component, with d720 Complex interpersonal interactions and d710 Basic interpersonal interactions being the categories



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that appeared most often. It should also be noted that two ICF categories, namely d160 Focusing attention and d163 Thinking, showed a high percentage in chapter d1 Learning and applying knowledge. This finding supports the idea that cognition plays an important role in everyday functioning, such as in activity limitation and participation restriction, as numerous studies have pointed out [5, 47, 48, 49, 50].

The b1 Mental functions chapter is the most frequent area in the Body Functions component. Several of the most frequently mentioned mental functions (e.g. b130 Energy and drive functions, b152 Emotional functions, b156 Perceptual functions and b160 Thought functions) are closely related to the most common symptoms of schizophrenia, such as negative symptoms, delusions and hallucinations [51]. The relevance of other frequently identified categories related to neurocognitive functions (e.g. b140 Attention functions and b164 Higher-level cognitive functions) is supported by several studies showing that cognitive deficits are core features of schizophrenia [52, 53, 54, 55]. Another frequent category identified in this component, and related to the b7 Neuromusculoskeletal and movement-related functions chapter, is b765 Involuntary movement functions, indicating that drug side effects remains an important issue in the literature [56, 57].

These results for the Body Functions component are clearly consistent with the finding that the most frequent body structure identified was s110 Structure of brain. Several studies highlight that patients with schizophrenia present subtle but consistent differences in certain brain structures and different patterns of brain activity in comparison with healthy controls [58, 59, 60, 61]. Moreover, these differences have been linked to the neurocognitive and social cognitive deficits associated with schizophrenia [62, 63].

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Regarding environmental factors, the only category to appear with a high frequency (85% of the articles) was e110 Products or substances for personal consumption, mostly because of the inclusion of the third-level category e1101 Drugs. This percentage of appearance is consistent with the fact that there are several issues related to pharmacological therapy in this population. Among these, an unsatisfactory response to antipsychotic therapy and medication non-adherence are common problems in these patients, and they are strongly associated with symptom relapse [64, 65]. Moreover, the management of side effects continues to be an important unresolved issue and is a common reason for polypharmacy in these patients. It should also be noted that the combination of two or more antipsychotics is also frequently observed (10-50%) in clinical practice [66, 67, 68]. In addition, it is worth pointing out that the category e110 Products or substances for personal consumption is also related to substance abuse, which is reported as a comorbid condition in at least 47% of patients with schizophrenia [69].

This study does have certain limitations that need to be considered when interpreting our results. First, we focused solely on articles published in English. Although this choice was made for practical reasons, it may have led us to exclude some interesting studies published in other languages. A further potential limitation is that due to the overwhelming number of published studies in this area, we followed the procedure used in previous ICF systematic reviews (e.g. [21]) and drew a random sample from among the initially retrieved and eligible studies. This procedure has recently been recommended by Selb et al. [11].

In conclusion, this systematic review highlights the research focus of the literature on schizophrenia. One contribution of the study is that the ICF categories it identifies reveal those aspects of HRQOL, based on the ICF concept of functioning, that are most

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relevant from the point of view of researchers. Specifically, the results show that most of the studies concentrate on the components Body Functions and Activities and Participation, rather than on Body Structures and Environmental Factors. In addition, this study enables the research perspective to be assimilated into the process of developing the ICF-CS for schizophrenia, thus providing a complement to the perspectives of patients and caregivers, health professionals and experts in schizophrenia. The availability of an ICF-CS for schizophrenia provides a practical tool that covers the entire spectrum of functioning of persons with schizophrenia and which uses a common language, and as such it can be used in documenting, reporting and assessing functioning in schizophrenia in any setting worldwide. Finally, our study also shows that the ICF provides a valuable reference for identifying and quantifying the concepts underlying the outcomes included in published studies focusing on individuals with schizophrenia.

### **Conflict of Interest**

The authors declare that they have no conflict of interest.

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Table 1. Examples of the linking process

Text in the article	Meaningful Concepts	Linking to ICF Category
“make emergency calls”	- Using telephone	- d360 Using communication devices and techniques
“initiate and maintain a conversation for 3 min”	- Initiate a conversation - Maintain a conversation	- d3500 Starting a conversation - d3501 Sustaining a conversation
“She had poor social interaction, remained withdrawn and did not engage in any household activities”	- Poor social interaction - Withdrawn - Household activities	- d710 Basic interpersonal interactions - b152 Emotional functions - d640 Doing housework

Table 2. Frequencies for study characteristics (N = 206)

	Number of studies	% (95% CI)
<b>Study type</b>		
Observational	164	79.6 (74.1-85.1)
Cross-sectional	141	68.4 (62.1-74.8)
Longitudinal	23	11.2 (6.9-15.5)
Intervention	41	19.9 (14.5-25.4)
RCT	26	12.6 (8.1-17.2)
CCT	1	0.5 (0-1.4)
Other intervention	14	6.8 (3.4-10.2)
Other studies	1	0.5 (0-1.4)
<b>Sample size</b>		
<10	5	2.4 (0.3-4.5)
10-50	96	46.6 (39.8-53.4)
51-100	48	23.3 (17.5-29.1)
>100	57	27.7 (21.6-33.8)
<b>Diagnosis</b>		
Schizophrenia alone	136	66.0 (59.6-72.5)
Schizophrenia spectrum disorders	61	29.6 (23.4-35.8)
Concomitant pathologies	6	2.9 (0.6-5.2)
Not reported	3	1.4 (0-3.1)
<b>Diagnostic criteria</b>		



DSM	159	77.2 (71.5-82.9)
ICD	19	9.2 (5.3-13.2)
DSM + ICD	9	4.4 (1.6-7.2)
Research Diagnostic Criteria	1	0.5 (0-1.4)
Not reported	18	8.7 (4.9-12.6)
Patient type		
Outpatient	64	31.1 (24.7-37.4)
Inpatient	33	16.0 (11.0-21)
Mixed	36	17.5 (12.3-22.7)
Not reported	73	35.4 (28.9-42)

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Note: RCT = randomized clinical trial; CCT = controlled clinical trial; DSM = Diagnostic and Statistical Manual of Mental Disorders; ICD = International Classification of Diseases

Table 3. Frequencies for first-level ICF categories linked to the concepts contained in the outcomes of studies (N=206)

ICF chapters	Description	Number of studies	% (95% CI)
<b>Body Functions</b>			
b1	Mental functions	196	95.1 (92.2-98.1)
b2	Sensory functions and pain	19	9.2 (5.3-13.2)
b3	Voice and speech functions	59	28.6 (22.5-34.8)
b4	Functions of the cardiovascular, haematological, immunological and respiratory systems	11	5.3 (2.3-8.4)
b5	Functions of the digestive, metabolic and endocrine systems	52	25.2 (19.3-31.2)
	Genitourinary and reproductive functions		
b6	Neuromusculoskeletal and movement-related functions	17	8.3 (4.5-12)
b7		154	74.8 (68.8-80.7)
<b>Body Structures</b>			
s1	Structures of the nervous system	71	34.5 (28-41)
s3	Structures involved in voice and speech	13	6.3 (3-9.6)
<b>Activities and Participation</b>			
d1	Learning and applying knowledge	152	73.8 (67.8-79.8)
d2	General tasks and demands	50	24.3 (18.4-30.1)
d3	Communication	47	22.8 (17.1-28.5)
d4	Mobility	11	5.3 (2.3-8.4)
d5	Self-care	86	41.7 (35-48.5)
d6	Domestic life	26	12.6 (8.1-17.2)
d7	Interpersonal interactions and relationships	155	75.2 (69.3-81.1)
d8	Major life areas	120	58.3 (51.5-65)
d9	Community, social and civic life	73	35.4 (28.9-42)

Environmental Factors

e1	Products and technology	174	84.5 (79.5-89.4)
e3	Support and relationships	13	6.3 (3-9.6)
e5	Services, systems and policies	48	23.3 (17.5-29.1)
pf	Personal factor	126	61.2 (54.5-67.8)
nc	Not covered	161	78.2 (72.5-83.8)
hc	Health condition	200	97.1 (94.8-99.4)
nd	Not definable	184	89.3 (85.1-93.5)

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Abbreviations: CI, Confidence interval.

Note: Only categories measured in >5% of all studies are displayed

Table 4. Frequencies for second-level ICF categories linked to the concepts contained in the outcomes of studies (N=206): Body Functions component

ICF code	Description	Number of studies	% (95% CI)
Chapter 1: Mental functions			
b110	Consciousness functions	51	24.8(18.9-30.7)
b114	Orientation functions	134	65.0 (58.5-71.6)
b117	Intellectual functions	127	61.7 (55-68.3)
b122	Global psychosocial functions	38	18.4 (13.1-23.7)
b126	Temperament and personality functions	156	75.7 (69.9-81.6)
b130	Energy and drive functions	160	77.7 (72-83.4)
b134	Sleep functions	51	24.8 (18.9-30.7)
b140	Attention functions	155	75.2 (69.3-81.1)
b144	Memory functions	105	51.0 (44.1-57.8)
b147	Psychomotor functions	165	80.1 (74.6-85.5)
b152	Emotional functions	167	81.1 (75.7-86.4)
b156	Perceptual functions	174	84.5 (79.5-89.4)
b160	Thought functions	176	85.4 (80.6-90.3)
b164	Higher-level cognitive functions	172	83.5 (78.4-88.6)
b167	Mental functions of language	124	60.2 (53.5-66.9)
b172	Calculation functions	12	5.8 (2.6-9)
b180	Experience of self and time functions	116	56.3 (49.5-63.1)
Chapter 2: Sensory functions and pain			
b230	Hearing functions	19	9.2 (5.3-13.2)
Chapter 3: Voice and speech functions			
b330	Fluency and rhythm of speech functions	59	28.6 (22.5-34.8)
Chapter 4: Functions of the cardiovascular, haematological, immunological and respiratory systems			

b420	Blood pressure functions	11	5.3 (2.3-8.4)
Chapter 5: Functions of the digestive, metabolic and endocrine systems			
b510	Ingestion functions	26	12.6 (8.1-17.2)
b530	Weight maintenance functions	25	12.1 (7.7-16.6)
b555	Endocrine gland functions	15	7.3 (3.7-10.8)
Chapter 6: Genitourinary and reproductive functions			
b640	Sexual functions	17	8.3 (4.5-12)
Chapter 7: Neuromusculoskeletal and movement-related functions			
b710	Mobility of joint functions	15	7.3 (3.7-10.8)
b730	Muscle power functions	38	18.4 (13.1-23.7)
b735	Muscle tone functions	14	6.8 (3.4-10.2)
b760	Control of voluntary movement functions	33	16.0 (11-21)
b765	Involuntary movement functions	144	69.9 (63.6-76.2)
b770	Gait pattern functions	16	7.8 (4.1-11.4)

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Abbreviations: CI, Confidence interval.

Note: Only categories measured in >5% of all studies are displayed

Table 5. Frequencies for second-level ICF categories linked to the concepts contained in the outcomes of studies (N=206): Body Structures component

ICF code	Description	Number of studies	% (95% CI)
Chapter 1: Structures of the nervous system			
s110	Structure of brain	71	34.5 (28-41)
s320	Structure of mouth	13	6.3 (3-9.6)

Abbreviations: CI, Confidence interval.

Note: Only categories measured in >5% of all studies are displayed

Table 6. Frequencies for second-level ICF categories linked to the concepts contained in the outcomes of studies (N=206): Activities and Participation component

ICF code	Description	Number of studies	% (95% CI)
Chapter 1: Learning and applying knowledge			
d135	Rehearsing	18	8.7 (4.9-12.6)
d160	Focusing attention	127	61.7 (55-68.3)
d163	Thinking	113	54.9 (48.1-61.7)
d166	Reading	21	10.2 (6.1-14.3)
d175	Solving problems	41	19.9 (14.5-25.4)
d177	Making decisions	22	10.7 (6.5-14.9)
Chapter 2: General tasks and demands			
d230	Carrying out daily routine	20	9.7 (5.7-13.8)
d240	Handling stress and other psychological demands	36	17.5 (12.3-22.7)
Chapter 3: Communication			
d315	Communicating with -receiving - nonverbal messages	24	11.7 (7.3-16)
d330	Speaking	17	8.3 (4.5-12)
d335	Producing nonverbal messages	17	8.3 (4.5-12)
d340	Producing messages in formal sign language	24	11.7 (7.3-16)
d350	Conversation	17	8.3 (4.5-12)
Chapter 4: Mobility			
d410	Changing basic body position	11	5.3 (2.3-8.4)
Chapter 5: Self-care			
d510	Washing oneself	65	31.6 (25.2-37.9)

d520	Caring for body parts	17	8.3 (4.5-12)
d540	Dressing	53	25.7 (19.8-31.7)
d550	Eating	12	5.8 (2.6-9)
d570	Looking after one's health	64	31.1 (24.7-37.4)

Chapter 6: Domestic life

d620	Acquisition of goods and services	15	7.3 (3.7-10.8)
d630	Preparing meals	13	6.3 (3-9.6)
d640	Doing housework	17	8.3 (4.5-12)

Chapter 7: Interpersonal interactions and relationships

d710	Basic interpersonal interactions	145	70.4 (64.2-76.6)
d720	Complex interpersonal interactions	149	72.3 (66.2-78.4)
d750	Informal social relationships	39	18.9 (13.6-24.3)
d760	Family relationships	31	15.0 (10.2-19.9)
d770	Intimate relationships	42	20.4 (14.9-25.9)

Chapter 8: Major life areas

d820	School education	78	37.9 (31.2-44.5)
d840	Apprenticeship (work preparation)	11	5.3 (2.3-8.4)
d845	Acquiring, keeping and terminating a job	70	34.0 (27.5-40.4)
d850	Remunerative employment	49	23.8 (18-29.6)
d855	Non-remunerative employment	18	8.7 (4.9-12.6)

Chapter 9: Community, social and civic life

d910	Community life	43	20.9 (15.3-26.4)
d920	Recreation and leisure	73	35.4 (28.9-42)

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Abbreviations: CI, Confidence interval.

Note : Only categories measured in >5% of all studies are displayed



Table 7. Frequencies for second-level ICF categories linked to the concepts contained in the outcomes of studies (N=206): Environmental Factors component

ICF code	Description	Number of studies	% (95% CI)
Chapter 1: Products and technology			
e110	Products or substances for personal consumption	175	85.0 (80.1-89.8)
e115	Products and technology for personal use in daily living	13	6.3 (3-9.6)
Chapter 3: Support and relationships			
e310	Immediate family	13	6.3 (3-9.6)
Chapter 5: Services, systems and policies			
e580	Health services, systems and policies	50	24.3 (18.4-30.1)

Abbreviations: CI, Confidence interval.

Note: Only categories measured in >5% of all studies are displayed

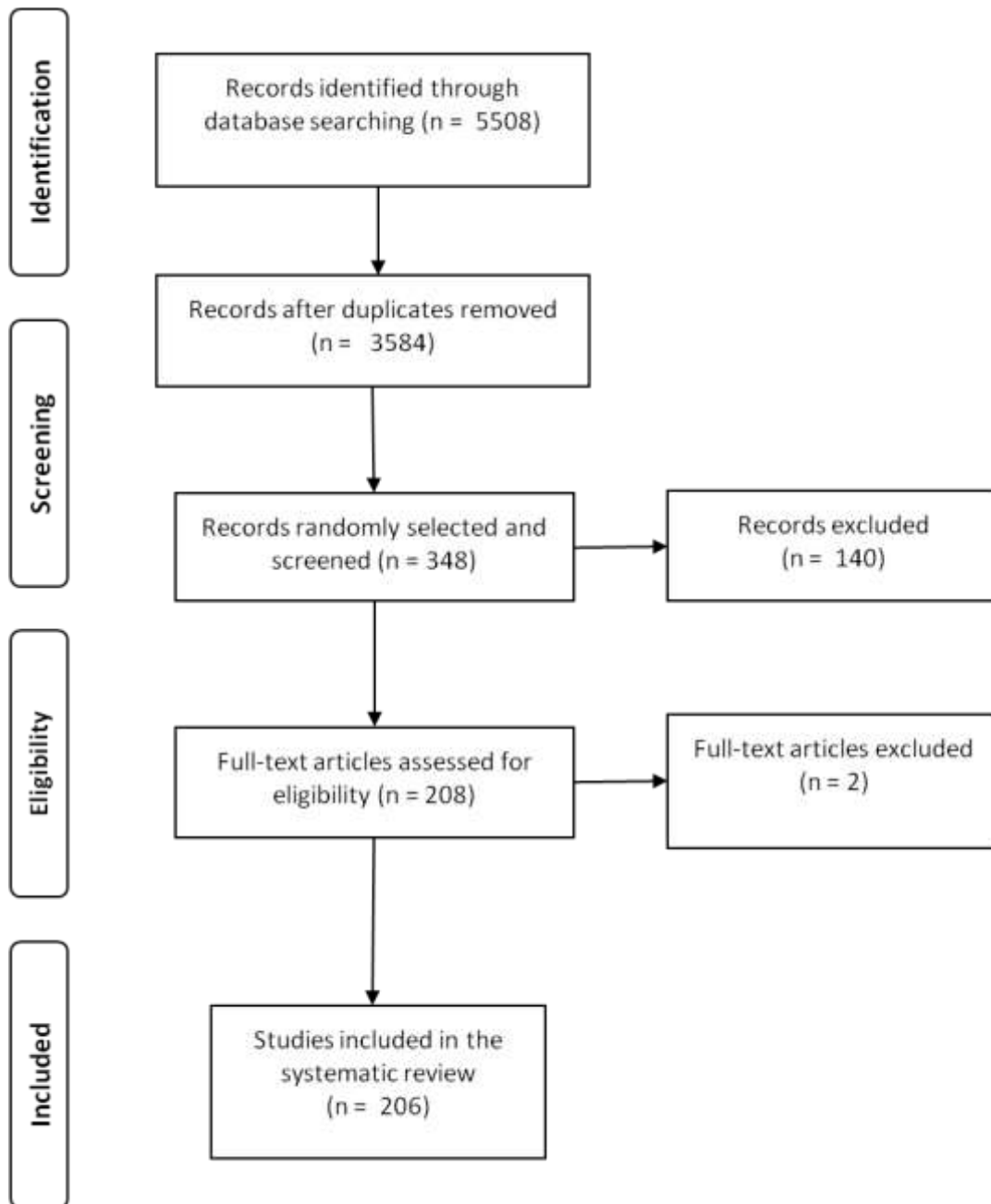


Figure 1. Flow diagram of literature review.

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