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Development and validation of the Social Functioning Scale, short version, in schizophrenia for its use in the clinical practice

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Introduction. The Social Functioning Scale (SFS) was designed to evaluate social functioning essential to schizophrenic patients. Its length may be difficult to use in clinical practice. The objective of this study was to develop and validate a short version of the SFS.

Methods. Data from 445 patients with schizophrenia who came from two separate studies, one longitudinal (n = 250) and one cross-sectional (n = 195), were used to produce and validate the short form of the SFS. The two samples were combined and then randomly split into two subsamples. In the first subsample (n = 223), items were eliminated using classical, modern (item response theory) psychometric criteria, as well as clinimetric criteria. The short version was independently validated using data from the other subsample (n = 222), by comparing the level of association (correlation and Area Under the ROC Curve [AUC]) with the EQ-5D VAS and the Clinical Global Impression (CGI), with the original scale.

Results. The original 78 items were reduced initially to 19 and 13 items (respectively using classic and modern psychometric criteria) and then to 15, since 2 items related with the employment capacity were added for clinimetric criteria. The short form of the SFS had a Cronbach's alpha of 0.76. Spearman correlation coefficients with the EQ-5D VAS and with the CGI score (0.46 and -0.42, respectively) were similar or even higher for the short version than for the original version. The AUC of the SFS and the dichotomous CGI were practically the same for both the original (AUC = 0.74) and the short (AUC = 0.73) versions.

Conclusions. The short version of the SFS proved to be reliable and valid. It could be useful in the common clinical practice.

Key words:
Social Functioning Scale. Schizophrenia. Questionnaires.

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Desarrollo y validación de la versión corta de la Escala de Funcionamiento Social en esquizofrenia para su uso en la práctica clínica

Introducción. La *Social Functioning Scale* (SFS) fue diseñada para evaluar el funcionamiento social de pacientes esquizofrénicos. Su longitud puede ser una dificultad para su uso clínico. El objetivo del trabajo fue desarrollar y validar una versión corta de la escala SFS.

Métodos. Se analizaron los datos de 445 pacientes con esquizofrenia que provenían de dos estudios, un ensayo clínico (n = 250) y un estudio observacional (n = 195). Las dos muestras se combinaron para dividir las posteriormente en dos submuestras aleatorizadas. La primera (n = 223) fue analizada para reducir los ítems utilizando criterios psicométricos clásicos, modernos (teoría de respuesta al ítem) y clinimétricos. La versión corta obtenida fue validada en la segunda submuestra (n = 222), estimando su asociación con la Escala Visual Analógica (EVA EQ-5D) y con la Impresión Clínica Global (ICG) y comparándola con la asociación de la versión larga.

Resultados. Los 78 ítems originales se redujeron inicialmente a 19 y a 13 (criterios psicométricos clásicos y modernos, respectivamente) y finalmente a 15, al añadir 2 ítems relacionados con la «capacidad de empleo» (criterio clinimétrico). La versión corta de la SFS no contiene subdimensiones. El coeficiente alfa de Cronbach fue de 0,76. La correlación de la versión corta con la EVA-EQ y la ICG resultó semejante o superior (0,46 y -0,42, respectivamente) a la de la versión original larga. El área bajo la curva ROC (AUC) mostró una capacidad discriminativa prácticamente idéntica para ambas versiones de la SFS (AUC: 0,74 para la original y 0,73 para la corta) respecto a la escala ICG.

Conclusiones. La versión corta de la SFS es fiable y válida, por lo que podría ser útil para la práctica clínica habitual.

Palabras clave:
Escala de Funcionamiento Social. Esquizofrenia. Cuestionarios.

INTRODUCTION

Schizophrenia produces very important psychosocial limitations¹. Ever since most of the schizophrenic patients began to be treated in the community instead of by long-term hospitalization the social function has been considered to be an increasingly important measure of the results in research and clinical practice for these patients². There are different scales to measure social functioning, social competences or level of social adaptation of schizophrenic patients in a standardized way³⁻⁵. They are used both to evaluate the social functioning level of the patient or a group of patients at a given time and to monitor the evolution of these patients over time, with or without intervention. However, their use is limited to research and their application in the daily clinical practice is uncommon⁶. This is due, among other reasons, to the lack of knowledge about the instruments available, lack of time and resources to administer the scales, difficulties to obtain a final score and to make an operational interpretation of the score⁷.

The Social Functioning Scale (SFS) was designed in order to evaluate those areas of social functioning that are essential for the maintenance of schizophrenic subjects in the community⁹. The SFS is completed through a medical interview and the areas included in the scale are: withdrawal, interpersonal behavior, prosocial activities, leisure activities, independence-competence, independence-performance and employment-occupation². It has been demonstrated that the Spanish version of the SFS (Escala de Funcionamiento Social) developed by Torres and Olivares is a reliable, valid and sensitive instrument¹⁰. Its original version has 78 items, this making it not very viable for routine administration in the usual clinical practice. A shorter version of the questionnaire could, however, be a very useful tool for the evaluation and follow-up of schizophrenic patients' social functioning in the clinical practice. There are several methods to reduce the items, the most important being: approach based on clinical criteria (clinimetric approach)¹¹, classical psychometric approach^{12,13}, which has recently been increased based on the item response theory (modern psychometric approach)¹⁴.

In this study, a short version of the SFS has been developed in order to be applied in the usual clinical practice of the patient with schizophrenia during his/her treatment. Its basic metric characteristics, reliability and validity, been evaluated.

METHODOLOGY

Patients

Two databases were available. The first one¹⁵ came from a randomized multicenter clinical trial (HGJK) with one year of follow-up of patients diagnosed with schizophrenia (DSM-IV criteria), who were randomly assigned to a treatment with the initial dose of ≥ 10 mg/day of olanzapine or ≥ 3 mg/day

of risperidone. The clinical trial was open label, with parallel groups and flexible dose. The patients were evaluated on enrolment, at 6 months, and at 12 months of follow-up. A total of 250 patients were enrolled and 159 of whom completed the follow-up. The second study, Schizophrenia Outpatient Health Outcomes (SOHO), was a naturalistic European study with three years of follow-up including more than 10,000 patients diagnosed with schizophrenia (DSM-IV criteria). The Spanish subsample of this study included a total of 195 patients.

Endpoints

Sociodemographic endpoints and the original Spanish version of the SFS (78 items) were measured in both studies. The Clinical Global Impression (CGI) scale¹⁶, a clinical assessment scale that varies from 1 «patient evaluated as normal» to 7 «patient evaluated among the most extremely ill» was also included in the first study (HGJK). The visual analogue scale of the questionnaire of the Euro-Qol quality of life (EVA EQ-5D), a visual analogue scale (in form of thermometer), was included in the second study (SOHO). This scale offers a global measurement of quality of life where 0 means the worst imaginable health condition and 100 the best imaginable health condition. This is a reliable instrument validated in different populations, including patients diagnosed of schizophrenia¹⁷.

Each one of the patients enrolled in both of the above-mentioned studies was randomly assigned to one of the two samples of approximately the same size and, consequently, their data were transferred to the sample they were assigned to. One of the samples was used in the item reduction process (reduction subsample: 223) and the other in the validation of the reduced form (validation subsample: 222).

Reduction of the SFS scale

Classical psychometric criteria

The classical psychometric approach was applied to the reduction sample, including the following phases:

- Identification of items with low response rate (criterion: eliminate those with more than 10% of lost values).
- Calculation of initial Cronbach's alpha of the process for the remaining items, identifying the items with low internal consistence (elimination criteria: item-scale correlation less than 0.20; and standard deviation (SD) ≤ 0.70 , that includes only 20% of the items of lower variability).
- To obtain the bivariate correlation matrix (elimination criterion: correlation greater than or equal to 0.75, due to presentation of information redundancy).

- Performing an exploratory factorial analysis with the principal components analysis (elimination criterion: saturation value of the rotated components matrix, by varimax rotation, equal to or greater than 0.70).

Modern psychometric criteria

- The Rasch analysis^{14,20} was used to verify if the reliability index was not less than 0.70. The map of the items of the scale obtained was used to evaluate their redundancy and the existence of possible information «gaps». Infit and Outfit values over 1.3 were applied as elimination criterion²⁰.

Clinimetric criteria

- Assessment of reduced version initially by 6 clinical specialists of the GEOPTE group (Spanish Group of the Optimization of Treatment in Schizophrenia) to analyze if, in their opinion, it was necessary to recover some of the items eliminated in the previous stages.

After the final short version was obtained, an exploratory factorial analysis was made to determine the existence or not of subdimensions of that version.

Reliability and validity of the short version of SFS

The metric characteristics of the short version of SFS were evaluated in the 222 patients enrolled in the validation subsample. Reliability was estimated by internal consistency, calculating Cronbach's alpha of the score. Adequate reliability for comparison of groups was considered to be the value of 0.7 or greater²⁰.

In order to analyze validity, the degree of association of the short version and long version was compared with the endpoints related to seriousness of schizophrenia. In the first place, the Spearman correlation coefficients were compared with the CGI and EVA-EQ-5D. In the second place, their discriminative capacity was compared using the calculation of the ROC area under the curve, using the endpoint of dichotomized CGI into two categories: «greatly or extremely ill» regarding those of lesser seriousness as reference. Finally, it was analyzed and verified that the endpoints of age and gender were not modifiers of the effect in relationship to the final score of the short version of SFS. To do so, a logistic regression model was made in which the dichotomized CGI was the dependent endpoint and the score of the short version, age (dichotomized in the median, 37 years) and gender were the independent endpoints.

In every case, a contrast of bilateral hypothesis with a significance threshold $\alpha \leq 0.05$ was taken into account.

RESULTS

Both subsamples (reduction and validation) were similar in regards to age, gender, mean score on the original SFS questionnaire and the distribution of the CGI scale. Statistically significant differences were only observed in the mean value of the EVA EQ-D5 scale, which was slightly higher in the validation group (table 1).

Obtaining of short version

Table 2 shows the stages of the item reduction process and the number of items eliminated in each stage. The greatest number of items was eliminated after performing the factorial analysis. Three out of the 6 items eliminated in the dimension work were eliminated in a first step as they had a percentage of loss values > 10% and the remaining 3 were eliminated in the next stage due to having a homogeneity index < 20. The items eliminated in this process came from different dimensions of the questionnaire, but mainly from the dimensions «independence-execution» and «independence - Competence» (data not shown).

Using the Rasch analysis, a good fit of the model (Infit: 1.03, and Outfit: 1.03) was observed and there were good reliability (0.99) and separation (11.64) values. The item map had an appearance of normal distribution and of absence of significant «gaps». Only 6 items that had Infit and

Table 1

Characteristics of the subsamples used in the reduction process and their subsequent validation

	Reduction subsample (n = 223)	Validation subsample (n = 222)	p
Age	38.2 (12.2)	37.9 (11.3)	NS
Men	149 (66.8 %)	143 (64.4 %)	NS
Mean score original SFS questionnaire	99.9 (24.9)	100.8 (26.1)	NS
EQD5-VAS*	68.4 (18.3)	75.6 (13.3)	0.003
CGI			NS
Normal, not ill	0 (0 %)	0 (0 %)	
Borderline mental illness	0 (0 %)	1 (0.7 %)	
Mildly ill	8 (7.1 %)	7 (5.1 %)	
Moderately ill	62 (54.9 %)	69 (50.4 %)	
Very ill	32 (28.3 %)	49 (35.8 %)	
Severely ill	11 (9.7 %)	11 (8 %)	
Extremely ill	0 (0 %)	0 (0 %)	

NS: non-significant. *95 % CI of the difference of the means: (2,7-11,7).

Table 2

Item reduction process according to the different criteria used

Item elimination process	Items that remain	Items eliminated
Classical psychometric criteria		
Initial items	78	0
Values lost (> 10 %)	75	3
Homogeneity index < 20	63	12
Standard deviation ≤ 0.70	52	11
Correlation coef.-Spearman ≥ 0.75	50	2
Factorial analysis (varimax rotation)	19	31
Modern psychometric criterion		
Rasch analysis	13	6
Clinimetric criterion		
Clinical criterion of experts	15	2*

* Two items added by clinical criterion.

Outfit values greater than 1.3 and an overlapping in the items map were eliminated. A reduced version of 13 items was obtained (fig. 1).

The 6 clinical specialists from the GEOPTE group (Spanish Group of the Optimization of Treatment in Schizophrenia) who reviewed the reduced version of the 13 items agreed that two of the items eliminated should be recovered. The 2 items were related with the capacity to perform a work, since the role function (defined as paid work, academic activity or housewife) is one of the keys in adequate social/work functioning^{22,23} (table 2).

Table 3 presents the number of items of each dimension of the original version that has been kept in the short version. The short version of the SFS is provided in detail in the annex. A new factorial analysis with Varimax rotation was made with this version to study the existence of possible dimensions where these items could be grouped. As no solution for the combination of all of them was found, the information of the short version is summarized in a single score (table 3).

Reliability and validity of the short version

Distribution of the scores of the original long and short version is shown in table 4. No differences were observed in the ceiling and floor effect and mean. However, as expected, the internal consistency measured by the Cronbach's alpha was greater for the long version (0.93) than for the short one (0.76).

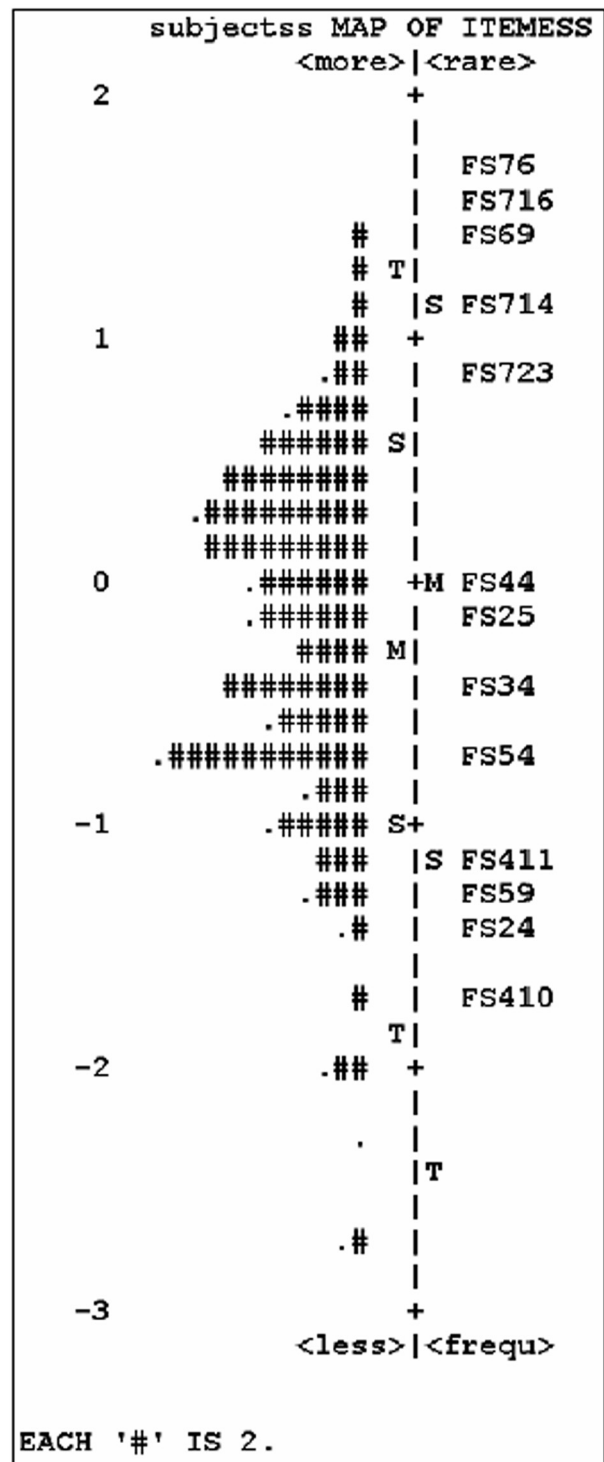


Figure 1 Mapping of the resulting 13 items after reduction by Rasch analysis.

Correlation between the short version and clinical endpoints of CGI and VAS EQ-5D was moderate and similar to or better than those obtained in the original questionnaire (table 5).

Table 3 Content of complete SFS questionnaire (original) according to dimensions and items retained in the short version

Group of items	Dimension	Number of items	
		Original scale	Short version
FS2	Withdrawal/social activities	5	2
FS3	Interpersonal communication	4	1
FS4	Independence-Performance	13	3
FS5	Independence-Competence	13	2
FS6	Leisure activities	14	1
FS7	Prosocial behavior	23	4
FS8	Employment-occupation	6	2
	Total	78	15

* The short version is analyzed as a whole, without calculating scores by dimension.

Table 5 Correlation (Spearman's coefficients) between SFS score (original and short version) with CGI and EVA EQ-5D (n = 222).

SFS score	CGI	EQ5D-VAS
Original questionnaire	-0,437	0,258*
Social activities	-0,346	0,591
Interpersonal communication	-0,472	0,456
Independence-Performance	-0,273	0,424
Independence-Competence	-0,294	0,442
Leisure activities	-0,174	0,445
Prosocial behavior	-0,203	0,341
Employment-Occupation	0,089*	-0,021*
Short version**	-0,420	0,463

* Non-significant. All the correlations $p < 0.001$, except (*), non-significant. ** The short version is analyzed as a whole, without calculating scores per dimension.

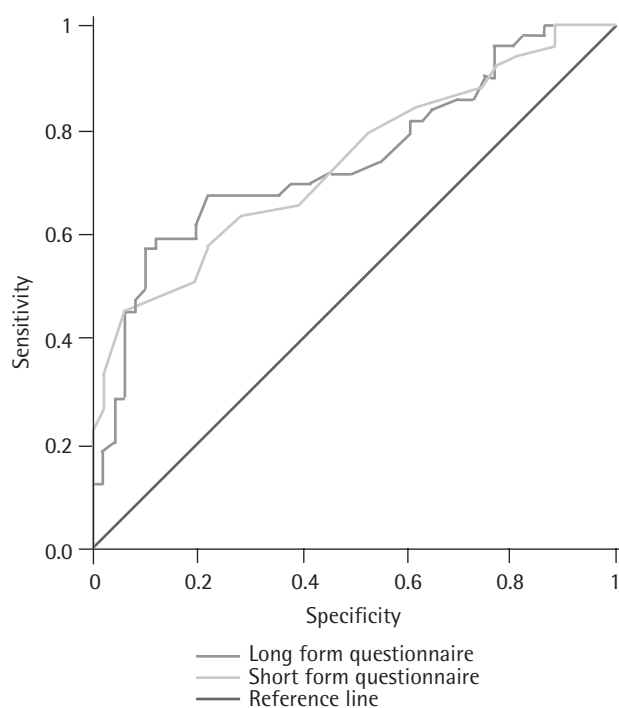
The multivariate logistic regression analysis showed that the endpoints of age and gender adjustment did not modify or affect the relationship between the b coefficient of the score of the short version CGI.

To evaluate the discriminant capacity of the reduced SFS questionnaire and lacking a «gold standard», the dichotomized CGI scale was used as reference. An area under the curve (AUC) of 0.73 (95% CI: 0.64-0.83), a value very similar to that obtained for the long version (AUC=0.74; 65% CI: 0.64-0.84) was found (fig. 2).

CONCLUSIONS

The interest in the measurement of the social functioning of the patient with schizophrenia has increased with the

common use of more effective and better-tolerated antipsychotic drugs. This measurement is of special interest in the framework of clinical care models focused on strategies of biopsychosocial intervention. In this sense, it is widely ac-

**Figure 2** ROC curves of the original and abbreviated SFS questionnaires, referenced on the dichotomized CGI scale depending on patient severity (not ill/moderately ill versus markedly or extremely ill).**Table 4** Characteristics of the SFS questionnaire according to the version (original and short), in the validation subsample (n = 222)

	Original scale	Short version
Number of items	78	15
Theoretical range	0-234	0-45
Observed range	33 -178	5-36
Cronbach's alpha	0.93	0.76
Ceiling effect: n (%)	1 (0.8%)	1 (0.5%)
Floor effect: n (%)	1 (0.8%)	1 (0.5%)
Mean (SD)	100.77 (26.1)	20.74 (6.1)

cepted at present that limitations in the social functioning of these patients make up a central aspect of schizophrenia both from nosological perspectives as well as from those of treatment and research. Thus, it is understood that the diagnostic systems such as DSM-IV include the requirement that there is deterioration in social functioning to establish a diagnosis of schizophrenia or that, from a purely clinical point of view, adequate treatment of the patient with schizophrenia cannot be understood as directed towards pure reduction of the symptom intensity if this is not accompanied by an improvement in their social functioning.

The concept of social functioning has generally been made operational through the evaluation of different groups of variables such as hospitalization duration, social contacts, employment and symptoms observed¹⁸ or by interdependence in relationships, degree of social activities, quality of company, relationship with children, friends or family, number of social relationships or quality of life¹⁹. In agreement with these models, social functioning evaluation scales have focused on measuring variables in relationship with employment or occupation, the role that patient has in his/her home, in his/her family, in the type of friendship or loving relationships, recreation or social activities in general.

The Social Functioning Scale (SFS) was designed with the objective of converting the variables involved in the individual's social functioning into coherent and reliable data in order to provide the clinician with the specific objectives that could be negotiated with the patients and their families. The Spanish version of the SFS (Escala de Funcionamiento Social) has been shown to be a reliable, valid and sensitive instrument. The correction table elaborated made it possible to locate the social functioning of each subject on a level that could be easily compared with those of other schizophrenic patients. Furthermore, it made it possible to establish measurable rehabilitating objectives and to establish a «comparative» framework with appropriate reference groups¹⁰.

A reduced version of the SFS scale has been developed in this work and its reliability and validity has been evaluated. The results suggest that the short version adequately represents all the concepts measured by the original scale with adequate reliability and similar validity to the long version. All this suggests its potential utility to evaluate the recovery of the schizophrenic patient from the view of his/her social functioning in the usual clinical practice.

Cronbach's alpha value calculated in the validation of the group of final items obtained through classical psychometry and the theory of response to the item was 0-76, a satisfactory value within the accepted accuracy range²⁰. Although the score of the short version of SFS may be somewhat inexact if it is used in a single patient, other advantages that come with its use should be considered. These could be the drastic reduction of time used to fill out the

questionnaire and the decrease of items without answer. These are fundamental aspects that make it possible to use it routinely in the usual clinical practice. It is important to state that since a clear grouping of the items of the short version has not been observed, it should always be evaluated through a single global score. Thus, it would not be adequate to obtain scores by dimensions to compare them with those of the original long version.

Within the limitations of this work, we stress the lack of a known gold standard included in the databases considered. Thus, two «external» endpoints were used the CGI and EVA-EQ5D to verify the validity of the item reduction process criterion, resulting in identical areas under the curve (0.74) for the original and reduced questionnaires in the case of CGI. On the other hand, the evaluation of the feasibility of the new questionnaire under the usual practice conditions would make it necessary to perform one or several studies for this purpose that would facilitate its measurement and verify the fulfillment of the psychometric properties (also under conditionals of usual practice) that have been established by this study.

In summary, a short version of the SFS scale that has good reliability and validity is available, thus making possible its use in clinical practice. This is important since social functioning is occupying an increasingly more relevant place in the assessment of the disease progress and the recovery that can be obtained through the different therapeutic resources. Studies in other patient groups and in contexts which are closer to the usual clinical practice are needed before the routine use of this scale can be recommended.

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Annex 1	Abbreviated social functioning scale (SFS)	
Withdrawal – Social activities		
How often does he/she leave the home? (for any reason) (FS24 = 0, 1, 2, 3)	0 = Never 1 = Rarely 2 = Sometimes 3 = Often	
How does he/she react to the presence of strangers? (FS25 = 0, 1, 2, 3)	0 = He/she avoids it 1 = He/she feels nervous 2 = He/she accepts it 3 = He/she enjoys it	
Interpersonal communication		
At present, is it easy for him/her to talk to people? (FS34 = 0, 1, 2, 3)	3 = Quite easy 2 = Fair 1 = Quite difficult 0 = Very difficult	
Prosocial behavior: in each column, check how often he/she has participated in any of the following activities in the last 3 months		
Exhibit (FS76 = 0, 1, 2, 3)	0 = Never 1 = Rarely 2 = Sometimes 3 = Often	
Gone to parties (FS714 = 0, 1, 2, 3)	0 = Never 1 = Rarely 2 = Sometimes 3 = Often	
Discotheque (FS716 = 0, 1, 2, 3)	0 = Never 1 = Rarely 2 = Sometimes 3 = Often	
Attended any church activity (FS723 = 0, 1, 2, 3)	0 = Never 1 = Rarely 2 = Sometimes 3 = Often	
Independence – Performance		
In each column, check how often he/she has participated in any of the following activities in the last 3 months		
Washes his/her own clothing (FS44 = 0, 1, 2, 3)	0 = Never 1 = Rarely 2 = Sometimes 3 = Often	
Uses money (FS410 = 0, 1, 2, 3)	0 = Never 1 = Rarely 2 = Sometimes 3 = Often	

Annex 1	Abbreviated social functioning scale (SFS) (continued)	
Has and administers his/her own money (FS411 = 0, 1, 2, 3)		0 = Never 1 = Rarely 2 = Sometimes 3 = Often
Independence – Competence: say if he/she is able to		
Cook for him/herself (FS54 = 0, 1, 2, 3)		3 = Adequately, does not require help 2 = Needs help to stimulate him/her 1 = Incapable, needs a great deal of help 0 = Unknown
Wash dishes, etc. (FS59 = 0, 1, 2, 3)		3 = Adequately, does not require help 2 = Needs help to stimulate him/her 1 = Incapable, needs a great deal of help 0 = Unknown
Leisure activities: check the appropriate answer that indicates how often he/she has done the following activities in the past three months		
Fixed things (bike, car, etc.) (FS69 = 0, 1, 2, 3)		0 = Never 1 = Rarely 2 = Sometimes 3 = Often
Employment - Occupation		
Does he/she have a regular job at present? (Includes occupational therapy, rehabilitation, or refresher courses) (FS81 = 1, 2)		1 = Yes 2 = No
Is he/she registered as disabled? (FS82 = 1, 2)		1 = Yes 2 = No