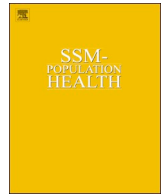




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## Article

## Development and validation of a questionnaire to measure family social capital

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## ABSTRACT

The development and psychometric validation of instruments to measure social capital remains a priority in the field. The aim of the current study was to develop a Questionnaire on Family Social Capital (FSCQ) for use in an adolescent population and to test its reliability and validity.

We followed an exploratory, sequential mixed-methods approach consisting of four steps: (1) item selection based on a conceptual model; (2) expert judgment of the conceptual model; (3) cognitive validation through focus groups; (4) psychometric validation, through principal components analysis (PCA) and confirmatory factor analysis (CFA) to assess construct validity, using Cronbach alpha and ICC to test reliability, and testing rural-urban differences to evaluate discriminant validity. A total of 429 3r and 4th ESO students participated in the study.

The resulting 26-item FSCQ demonstrated a second-order model with two dimensions and seven first-order factors. The model showed good internal consistency and reliability, as indicated by the Chi-squared value ( $\chi^2 = 155.834$ ;  $p = 0.91$ ) and CFI(0.936). Discriminant validity tests showed significantly higher scores for the structural FSC and the total FSC scores for the rural group. We conclude that the instrument is an adequate tool to study family social capital in adolescents.

## 1. Introduction

Research on social capital and health has increased since 1996, when the concept was first introduced in the public health literature. However, the use of non-validated measures has hampered progress in the field.

Social capital is defined as the resources available to individuals and groups through membership in social networks and it can be conceptualized either at an individual (egocentric) or collective (socio-centric) level (Moore & Kawachi, 2017; Porta, 2014). The different scales at which social capital has been studied range from the macro-level (regional or country level), to the meso-level (neighborhoods, workplaces, schools), down to the individual level. However, one evident gap remains the level of the family,<sup>1</sup> as noted in a recent systematic review on the topic (Carrillo, Kawachi, & Riera, 2017).

According to the authors, social capital in the family has been

measured in very heterogeneous ways and has drawn from both the social cohesion and the network approaches (Kawachi & Berkman, 2000; Kawachi, Subramanian, & Kim, 2010). Measures of family cohesion have emphasized four sub-domains: collective efficacy, informal control, social interaction and sense of belonging. In adolescents, higher levels of informal control (normally conceptualized as parental surveillance), has been associated with better mental health (Furstenberg & Hughes, 1995; Rethon, Goodwin, & Stansfeld, 2012; Wu et al., 2010). Only Wu et al. provide an explanation for this association, which would be due to an increased attention and involvement from parents. Social interaction is the most commonly tapped construct, capturing contact between family members, and often focusing on specific activities, e.g. eating dinner together. In teenagers, Morgan and Haglund (2009) did not find a significant association between family social interaction and life satisfaction, but others did show a protective effect in outcomes such as overall self-reported health (Ferlander and Maekinen 2009;

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<sup>1</sup> Family social capital is referred here to as the social capital that can be drawn from the family environment.

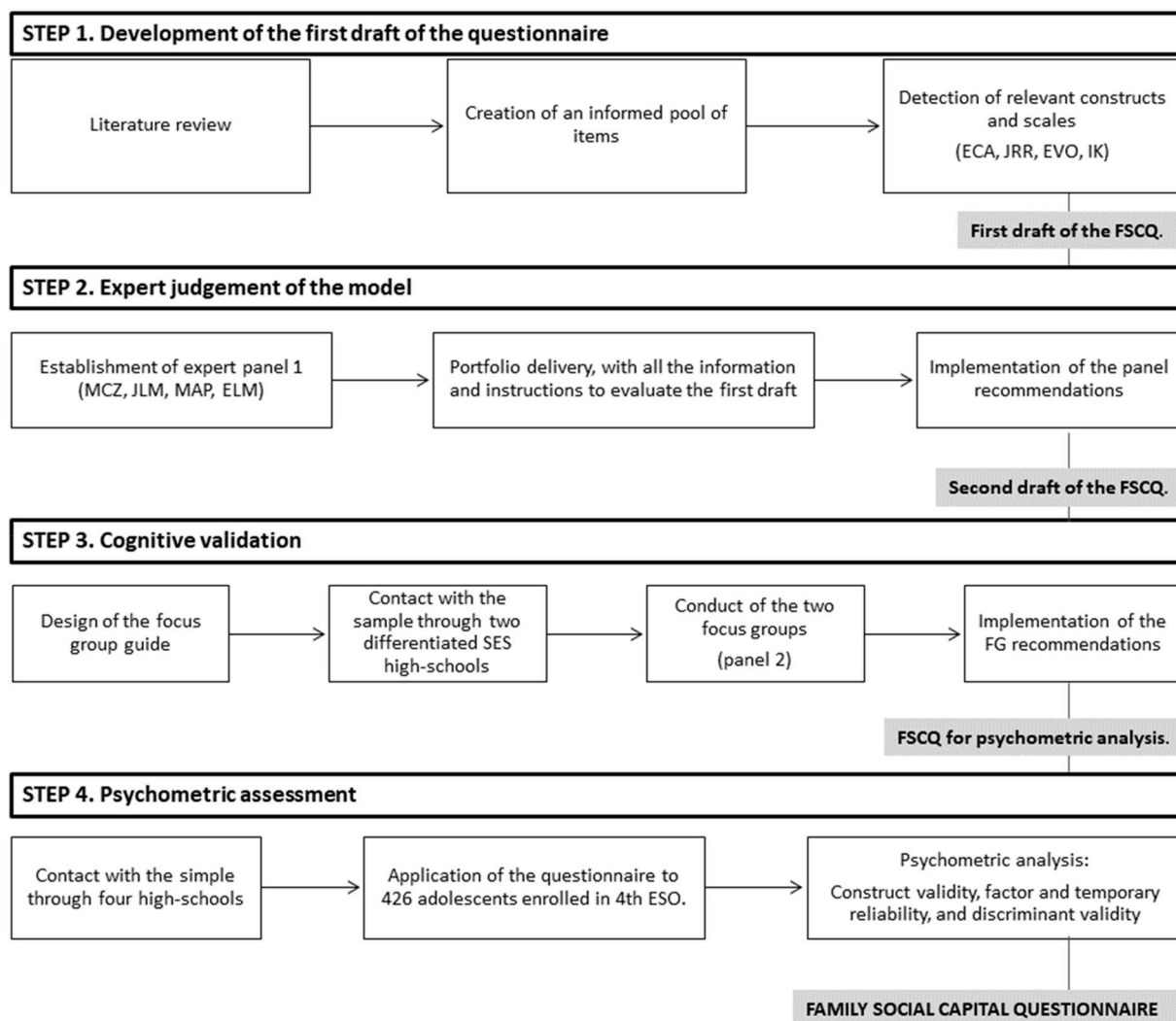


Fig. 1. Flow-chart of the process applied in the development of the FSCQ.

Morgan, Rivera, Moreno, & Haglund, 2012), obesity (Bala-Brusilow, 2010), the consumption of fruits and vegetables (Morgan et al., 2012), or mental health (Rothon et al., 2012; Wu et al., 2010). Sense of belonging (to the family) has been related to secure attachment and better mental health and overall wellbeing in adolescents (Jokinen-Gordon, 2007; Rothon et al., 2012). No extant papers have focused on collective efficacy as a measure of family social capital in adolescents.

Studies of family social capital based on a *network perspective* fall roughly into two categories: One, following the work by Coleman, considers marital status, the number of adults, and number of children in the household (Ferlander, Ma, Maekinen, & Ma, 2009; Furstenberg & Hughes, 1995; Helliwell & Putnam, 2004; Runyan et al., 1998), and a second separate strand developed by Litwin (2014), Litwin (2011), Litwin and Stoeckel (2014) Litwin and Shiovitz-ezra (2010), Moxley, Jicha, and Thompson (2011), Keating and Dosman (2009) and Widmer, Kempf, Sapin, and Galli-Carminati (2013) that draws upon network analyses to go deeper into the study of family ties. In youth, the main measure used has been the ratio of children/adults as an indicator of the availability of parental resources allocated within the family. However, no strong relationships were found between this measure and health outcomes in terms of overall wellbeing or mental health, contrary to the seminal results by Coleman (1988) in the realm of educational achievement.

Notable differences in the use of the two approaches appear in relation to the subjects' life stage and characteristics: research on elderly

and on people with disabilities have almost exclusively relied on the study of networks and social support (Litwin & Shiovitz-ezra, 2010; Litwin & Stoeckel, 2014; Howard; Widmer et al., 2013), as opposed to investigations in children and youth, which have tended to adopt the social cohesion approach (Han, 2012; Morgan et al., 2012; Rothon et al., 2012; Pettit & McLanahan, 2003). We suggested that the definition of family could lie behind these differences, as, departing from Coleman's work, a good part of the research on family social capital has focused on how certain parent-child relations make resources available to children. Seen in this way, "the family network" is constituted only by the children and their parents. However, given the broad range of family roles and structures across societies and cultures (European Communities, 2003; United States Census Bureau, 2011), a straightforward adoption of the household unit and/or nuclear family as the definition of "family" is, to say the least, biased. Moreover, the extended network of relatives can provide different kinds of resources that certainly should be considered as a part of family social capital. In fact, authors like Widmer, Kempf-Constantin, Robert-Tissot, Lanzi, and Carminati (2008), Donati & Prandini, 2007, Prandini (2007) or Ravanera and Rajulton (2010) make the point and provide examples showing that the definition of family had a great influence on the assessed level of social capital. In this way, they describe family as a *veritable social subjectivity*, whose composition and level of interconnectedness condition the type and amount of social capital available to the individuals inside the family system.

Thus, while family social capital has been posited as a cornerstone of social capital (Bourdieu, 1986; Coleman, 1988; Fukuyama, 1999; Newton, 2001; Putnam, 1995) a sound understanding of how it may influence health has not been achieved due to a dearth of research on the topic, the lack of integration with the social capital accessed through different settings or levels, the heterogeneity of measures used, and the absence of validated measurement tools (Carrillo & Riera, 2017; Harpham, Grant, & Thomas, 2002; Van Deth, 2003; Villalonga-Olives & Kawachi, 2015).

Accordingly, the purpose of this study was to develop a questionnaire instrument to measure family social capital for use in an adolescent population. The choice of this population group is motivated by the observation that adolescence is the stage in the life course during which social relations deserve much attention (Villalonga-Olives & Kawachi, 2017), where there is a re-negotiation of roles within the family and which has been described as the last best chance to prevent adult non-communicable diseases (Patton et al., 2012; Reiner et al., 2019), making research on this age-frame most timely.

## 2. Methods

The development and validation of the Family Social Capital Questionnaire (FSCQ) was conducted through an exploratory, sequential mixed-methods approach (Meissner, Creswell, Klassen, Plano, & Smith, 2011). The process consisted of four steps: (1) item selection based on a conceptual model; (2) expert judgment of the conceptual model; (3) cognitive validation through focus groups; (4) psychometric validation. Fig. 1 provides an overview of such process:

### 2.1. Development of the first draft of the FSCQ

The design of the questionnaire was based on a systematic review on the use and measurement of family social capital in public health described in the introduction section (Carrillo et al., 2017). Based on the previous literature, we determined that family social capital should comprise questions that ask about different aspects of structural social capital – i.e., observable elements of the network – such as the structure and nature of the ties, the frequency of social interactions and the available resources and norms that come with them; as well as cognitive social capital – this is, people's perceptions of the networks they are embedded in, such as family cohesion, sense of belonging, informal control or collective efficacy. Further, we differentiated between the family social capital available within the household versus through connections with family members outside the household.

According to these criteria, a first version of the FSCQ was drafted. Four investigators (ECA, JRR, EVO, IK) made a first selection of such items, obtaining a total of 56 items grouped into 12 categories (which corresponded to the different sub-domains identified in the literature). Ten out of 12 categories used categorical or Likert scales responses, while the other two consisted of open-ended queries in which participants were asked to write down their kinship with different members of their family (i.e. taking care to avoid prejudicing the respondents' own perception of what constituted their "family"). Table 1 shows the different dimensions of family social capital (structural, cognitive, horizontal), as well as the different sub-domains that at a theoretical level comprise each dimension, the specific indicators (i.e., the ways in which social capital is expressed) and its correspondence with the different items of the FSCQ. An English version of the original Spanish first draft can be found in supplemental file 1.

### 2.2. Expert judgement of the model

Four scholars with expertise in the field of social capital and adolescents (MCZ, JLM, MAP, ELM) were contacted by e-mail and invited to participate in the study as the Expert Panel 1. The goal of the expert panel was to assure content validity of the questionnaire by

independent evaluations. They were handed a portfolio that included (1) a description of the theoretical background upon which the questionnaire had been developed, (2) a first draft of the questionnaire; (3) copies of the invitational letters and informed consent forms to be given to the survey participants; (4) a response grid, where the experts are asked to give their opinion with regard to adequacy, comprehensibility and clarity of the proposed categories, indicators, and items. A detailed summary of the comments by the expert panel and the respective decisions made accordingly is shown in Table 2.

### 2.3. Cognitive validation through focus groups

The cognitive validation of the FSCQ was carried out through two focus groups with adolescents (panel 2). This type of validation ensures that the questions and instructions are correctly understood by the participants, as well as to identify words and categories used by the target population and that can help to reformulate items (Morales, 2000).

The two focus groups were held in February 2015, and participants were approached through a convenience sampling in two Catalan high schools. Given the fact that SES and living in a rural or urban area is likely to influence responses, two different and complementary settings were established to reach the sample: *INS Pere Borrell* (Puigcerdà) and *Jesuïtes Casp-Sagrat Cor de Jesús* (Barcelona).

In both schools, the school board was first approached via email in which the study was introduced and the specific collaboration they were asked for was described. Schools were requested to select 10–12 4th ESO students (this is 15-16-year-old students) with different social and academic profiles in order to ensure a greater range of inputs to our discussion. The students that were invited by the schools and whose parents signed the informed consent participated in the focus groups with a final sample of 12 students from *INS Pere Borrell* and 15 from *Jesuïtes Casp*. Both groups were balanced in terms of gender composition.

The focus group were carried out at the schools and took approximately 40 min to complete. At the beginning of each session, participants were provided with an explanation of the research and were encouraged to participate and give their opinion as much as possible. They were handed out a copy of the questionnaire and were asked to give a general opinion of the comprehension of the document, as well as rephrase complex questions in their own words. Beyond these, other specific questions regarding the most controversial points of the questionnaire were asked. Table 3 shows such questions and the participants' responses. At every participant's intervention, consensus was sought from all the members of the group. Comments made during the first focus group (rural context) were checked during the second one (urban-high) with the aim of overcoming potential context-driven meanings. The changes made at this point produced the final version of the questionnaire for the psychometric evaluation.

### 2.4. Psychometric assessment

Construct validity was tested in a two-step procedure. The first step involved a Principal component analysis (PCA) with the aim of identifying how the items in the initial model behave in our sample and the appropriateness of simplifying its structure. The second step was to confirm the structure suggested by the PCA using confirmatory factor analysis, CFA. A separate PCA was conducted for each of the FSCQ dimensions: structural and cognitive social capital. The following analysis were conducted: (1) item-to-total score correlation; (2) principal component analysis using Promax rotation with Kaiser normalization – at this point, several factorial solutions were tested to select the one with the best factorial adequation, higher internal consistency and parsimony, as well as interpretability and theoretical coherence of the results; (3) internal consistency reliability analysis using Cronbach alpha.

**Table 1**

Relevant subscales, categories and indicators identified in the literature review, along with its correspondence with the different items of the FSCQ.

Dimensions	Sub-domains	Indicators	Items of the FSCQ
Structural SC	Structure of the network	- Number of family members in the household. - Number of family members outside the household	1; 3
	Quality of the ties Social Interaction	- Relationship (father, step-mother, brother, uncle ...) with the members of the family. Frequency of doing the following activities with the household and outside the household family members: a. Playing indoor games b. Going for a walk c. Do the shopping d. Going to the movies, to a concert, to a picnic. e. Sitting and talking f. Having dinner together g. Talking on the phone h. Visiting relatives i. Going to church together j. Going to watch sports events k. Watching TV shows together l. Preparing meals together m. Do homework together (eg parents helping children, siblings helping each other)	2; 4 7; 8
Cognitive SC	Collective efficacy	Perception of working well as a family (with members inside and outside the household)	9.1; 10.1
	Informal Control Sense of belonging	Perception of importance of following family's rules (with members inside and outside the household) Closeness (with members inside and outside the household) Reliability on family members for support and help with serious problems (with members inside and outside the household)	9.2; 10.2 3; 5 9.3; 10.3
	Family conflict	Excess of demands (with members inside and outside the household) Personal goals conflicting those of the family (with members inside and outside the household) Frequency of arguing (with members inside and outside the household) Critiques between family members (with members inside and outside the household)	11; 12
Horizontal SC	Bridging SC	Number of connections (existing and in the last month) with family members outside the household whom, compared with family members in your household: - Have different ways of spending leisure time. - Have different nationalities. - Have a lower educational background. - Have a higher educational background. - Have different sexual orientations. - Have more economic resources. - Have less economic resources. - Have works related to ... examples of occupation for different social classes	6

After this exploratory step, the use of CFA methods in a different sample is recommended to validate the factor structure and provide further evidence of construct validity (Fabrigar & Wegener, 2012). Thus, a CFA was next used to verify the goodness of fit of the model built according to the results of PCA. Besides the Chi-square value (indicating good adjustment when p value is no significant); other fit indices and incremental indices were also calculated, including goodness of fit index (GFI) (value is good when  $\geq 0.95$ ), RMR (considered adequate below 0.08); normed fit index (NFI) (optimal above 0.95); factorial weights were considered ideal above 0.7 and good over 0.5 (Cabrera-Nguyen, 2010).

Discriminant validity evaluation is an additional procedure in the development and validation of psychosocial scales that seeks to evaluate if the questionnaire discriminates well when comparing different population characteristics. Based on previous studies (Greiner, Li, Kawachi, Hunt, & Ahluwalia, 2004; Sørensen, 2016; Tobiasz-Adamczyk & Zawisza, 2017) our hypothesis was that there would be significant differences in the mean family social capital reported by urban versus rural adolescents.

Test-retest reliability with Interclass Correlation Coefficient (ICC) was calculated based on a second administration of the questionnaire three weeks after the first application. The three weeks' time frame was considered appropriate because major changes in the answers are not expected and to avoid that participants remember what they answered in the first administration. Its optimal value has been suggested to be over 0.81 (MacKenzie & Podsakoff, 2005; Morales, 2000).

All analyses were performed using IBM-SPSS.22, with the AMOS extension for CFA.

#### 2.4.1. Sample

All participants were recruited through a convenience sample of four secondary schools from different socioeconomic contexts, using as a first criteria the rural-urban axis and, as a second, the Gross Household Disposable Income of the area (IDESCAT, 2013): (1) Rural, all SES – *INS Pere Borrell*, Puigcerdà; high-income urban - *Jesuïtes Casp*, Barcelona; middle-income urban; *INS La Llauna*, Badalona; and low-income urban; *INS Eduard Fontserè*, L'Hospitalet). As in the previous phase, the School Board was contacted by email, inviting the schools to participate by facilitating access to one or more groups of their 3rd and 4th ESO students (14-16 years-old). High-schools were offered the possibility of their students receiving a conference about healthy eating, as a reward for their collaboration.

Data collection was completed in two differentiated moments to comply with the schools' time preferences: early March, and late April 2015. 3rd and 4th ESO students from the four high schools participated in the two moments. These two subsamples exceeded the minimum size considered adequate for factor analysis, < 100 (de Vet, Adèr, Terwee, & Pouwer, 2005), and were randomly assigned to perform PCA and CFA.

The sample assigned for PCA was the one collected in April 2015 and was completed by 245 students, of whom 59 participated in a test-retest assessment of the questionnaire, conducted three weeks apart. The sample for CFA, collected in March 2015, was constituted by 184 students. Table 4 summarizes both samples' most relevant characteristics.

#### 2.4.2. Scoring of the FSCQ

Questions 1 to 5 (network composition) were established as informative: while they provide valuable information regarding the

**Table 2**  
Expert judgment feedback and decisions made in response.

#	Reviewer 1	Reviewer 2	Reviewer 3	Reviewer 4	Decisions made on the comments
1		What about teenagers living in two households? What about emancipated teenagers?			Given the many different forms that a family can take in current western societies we decide to only refer to 'members of the family inside the household' and 'members of the family outside the household', as it is considered to be the most objective way for everyone. Because of our broad conception of the notion of family and its subjective dimension discussed in the theoretical framework, we opt for not specifying which types of relationship are to be included. Siblings living outside the household should be counted as 'family outside the household'.
2				Maybe it would be interesting to specify what we understand by 'close relationship' by adding an adjective (trust, etc.).	
3				Is any type of relationship included (e.g. second cousins ...?). In any case, it could be specified.	
4		What about siblings living outside the household?			
5		30 lines may not be enough in some cases			
6					
7	7.1. Is it relevant? 7.2. This question is difficult, but I imagine that there is no better way to ask? 7.4. Add additional examples? 7.4. I would write examples that include more categories (e.g. athletes, artists). 7.8. This question is very clear, if it can serve as an example for 7.2.	7.4. These are difficult questions, considering that they have to be answered by adolescents with different cultural level. 7.7 & 7.8. Compared to whom?	7.4. Is there an alternative way of asking these questions? -Is the proposal of the SEF still valid, considering the changes occurred in the labor market in the last years?	We decide to maintain the questions as they are, and to test its comprehension during the focus groups in the next phase.	
8	Why not having lunch? And other activities such as reading, playing an instrument, doing handicrafts,				
9					
10	It would be interesting to ask about the existence of family rules regarding: a. Regular bed time b. Limits on screen time c. Rules about dating d. Rules about smoking & drinking e. Rules about using foul language at home f. Supervision of homework				Lunch will be included in this question, since is very common in Spain that children/teenagers eat lunch at home. The selection of activities will be broadened with their suggestions.  These questions will be added to the questionnaire.
11		Use 6-degree likert scales (instead of 4-point scales) in order to facilitate responses.			This modification will be made in all the applicable questions.
12		1.2.2. The personal goals ... Does it refer to the subject responding 'family'.			The original question refers to any member of the family, as a tendency of the group. Question 12 is reformulated accordingly.

(continued on next page)

Table 2 (continued)

#	Reviewer 1	Reviewer 2	Reviewer 3	Reviewer 4	Decisions made on the comments
13		<p>the questionnaire or to any member of the family?</p> <p>Why don't you ask about positive attitudes or situations? Does the absence of negative situations indicate positive predispositions?</p> <p>Why items 10 and 11 ask about the degree of agreement and 12 and 13 ask about frequency?</p> <p>I miss some more explicit references to concepts such as cohesion and trust within the family</p>	<p>The same as 12.</p>	<p>The positive aspects of the family relationships are assessed in other questions. These items only focus (intentionally) on negative qualities of the family relationships.</p>	

composition of the family network of the respondent, there is not enough theoretical foundation for applying any consistent scoring – it would entail determining that one family size is *better* than other, and such kind of assertion is not sustained by the current evidence (Donati & Prandini, 2007; Riera, 2011).

Thus, the total score of the FSCQ was obtained by linear summation of all items' scores (1–6, following the likert scale), except for the ones belonging to family conflict, whose value was deducted from the total score, according to its negative influence.

### 3. Results of the psychometric testing

A PCA (principal component analysis) was performed for each of the FSCQ subscales or dimensions (structural and cognitive), which constitute the second-order factors of our scale (DeVellis, 2017). For comprehensibility purposes we will reserve the term “factor” to the first-order factors in each dimension – which correspond to the *sub-domains* of the conceptual model, as described in Table 1 of this paper.

The value of KMO was 0.811 for structural social capital and 0.721 for cognitive. Bartlett's test met a significant level ( $\chi^2 = 789.413$ ,  $p = 0.001$ ;  $\chi^2 = 890.417$ ,  $p = 0.001$ ), suggesting that the data were suitable for factor analysis. Item depuration responded to three independent criteria, eliminating items with factor loading lower than 0.50; items whose belonging to a given factor was conflicting at a theoretical level; and items that diminished the internal consistency of the factor.

To decide on the number of factors to retain, we discarded the K1 Kaiser criteria (eigenvalues > 1) as it has been observed to overestimate the number of factors (Izquierdo, Olea, & Abad, 2014). Thus, after considering parallel analysis, sedimentation graph and the significance and theoretical coherence of the factors, the PCA yielded a second order model with 21 items divided in 7 factors. The structural FSC dimension is composed of four first-order factors (Communication, Shared Food, Shared Leisure HH, Shared Leisure OH), and the cognitive dimension is comprised of three first-order factors (Cohesion HH, Cohesion OH, Conflicts). SPSS 22 was used for this analysis.

While this structure differed from the initial model; it was considered adequate, as it reflected how teenagers experience their family environments based upon two axes: family within or outside the household; and area of the adolescent life (conversation, leisure activities, food-related activities, family wellbeing, family conflict).

Table 5 shows the factor loading of items above 0.50 and the communalities, all of them higher than 0.5. This model was able to explain the 64.8% of the variance of the structural social capital subscale and 74.04% of the cognitive subscale.

The results of the reliability analysis (Table 6) show that the internal consistency of each dimension's first-order factors is satisfactory. Factors 5 and 6 show alpha values above 0.8; factor 7's is 0.725 and factors 2, 3 and 4 have values below 0.7. Reliability for the overall structural and cognitive FSC sub-scales were 0.789 and 0.792, respectively. Table 6 also shows the mean and standard deviation for the seven factors, as well as the correlations between the latent factors within each subscale. Intra-class correlation coefficient was CCI = 0.858 (CI95%: 0.772-0.913), which indicates excellent temporal consistency.

As Fig. 2 shows, CFA confirmed an overall very good fit between the observed data and the theoretical model, as indicated by the Chi-squared value ( $\chi = 155.834$ ;  $p = 0.91$ ) and CFI (0.936). RMR and NFI can be considered adequate, especially taking into account the other indicators. Family conflict appeared to be a latent variable of the whole FSCQ scale, correlated to cognitive SC but not with the structural subscale.

With regard to discriminant validity, Table 7 shows mean and SD of the rural and urban groups for each factor, subscale and total FSC score. Mean differences were calculated over the entire sample (426 adolescents). Differences were significant in the case of shared food (F2), leisure with household members (F3), leisure with members outside the

**Table 3**  
Comments made by the participants in the focus groups and decisions made in agreement.

#	Additional queries asked	Comments made by the participants in the focus groups	Modifications made in agreement
1	Who they considered to be their family member, inside and outside their household and to provide some examples;	Some adolescents live in two households.	A box that adolescents can check to indicate they live in two households was added
3, 6	What did they understand by “close relationship”, how did they know when they had one and whether they would express this idea in other terms	Adding the concept ‘confident’ makes the writing clearer.	Added
5		Writing down all the relatives’ kinship is time-consuming, especially for those with large extended families.	In order to simplify this question but still do not condition the responses of the participants, the indication of writing down the type of kinship and, besides, indicating between brackets the number of individuals that comply with this type of relationship was added.
7	Provide examples of the type of activities that they did with their family members;	Other examples of activities that the adolescents do with their families include doing home chores or homework.	Included.
9	Whether the questions regarding bridging social capital were easily understood, or whether they could express these ideas in different words	Question 9 is the most complicated to understand and problematic. Some students say they do not know the educational level or occupation category of their relatives. The same way, often they are not aware of the economic resources their relatives have.	Because of the difficulty of responding to this question, we opted for withdraw it, as the problem was not so much about comprehension than about having the proper knowledge to respond it.
10		They miss a question about home chores.	We include this item.
11, 12	Provide examples of problems or difficult situations that can arise between family members or that they, as a group, may have to face; and examples of situations in which family members are too demanding with one another.	Because most of the adolescents do not have ‘serious problems’ at this age, they suggest to add also ‘important decisions’.	We accept and include this suggestion.

**Table 4**  
Sociodemographic data of the sample for PCA and CFA.

		PCA	CFA
		n (%)	n (%)
Gender	Male	126 (48.8)	83(42.49)
	Female	132 (51.2)	101(57.51)
Context	Rural	90 (36.7)	80 (43.5)
	Urban	155 (64.3)	104 (56.5)
Adolescent origin	Immigrant	74 (28.7)	33(17.94)
	Autochthonous	184 (71.3)	151(82.06)
Highest household educational level	No schooling or primary studies	42 (16.3)	11(05.97)
	Compulsory secondary school	13 (5)	27(14.67)
	Post-compulsory secondary school	31 (12)	34(18.47)
	Unfinished university	24 (9.3)	19(10.32)
	University studies	140 (54.26)	53(28.80)
	No data	8 (3.1)	40(21.73)

household (F4); all of them belonging to the Structural FSC subscale. Consequently, the structural FSC scale and the total FSC score were significantly different among rural and urban adolescents, being higher in the first group.

#### 4. Discussion

This paper reports the process of development and validation of a questionnaire to evaluate family social capital in adolescents. This is, to the best of our knowledge, the first validated questionnaire to assess family social capital in this population, and it has been elaborated through a four-step procedure. In this process, several changes were made to the FSCQ, including reduction of items from 56 items to 26 items (five of which are informative), and identification of a two subscale structure. This significant reduction in the number of items is a consequence of the elimination of the items related to bridging FCS [#14] and norms [#7], and the results of the PCA, in which 10 items were eliminated.

Although the norms section was, following the literature recommendations on scale development (MacKenzie & Podsakoff, 2005), withdrawn from the final questionnaire due to its composite nature, we still believe it is a useful complement to the final FSCQ that can help understand the links between family social capital and health outcomes. In our case, we had included items about home chores, curfew, drugs, food, bedtime, etc., but we suggest that these are adapted to the particular interest and theoretical foundation of every study (Carrillo & Riera, 2017). The bridging section was eliminated because the adolescents did not have enough knowledge to respond the different questions (i.e.: the educational level or precise occupation of their relatives). From a theoretical point of view, this was an interesting information to collect in order to assess family social capital; and future researches should investigate how to adequately include.

The final model was structured following two criteria: family within or outside the household; and area of the adolescent life. While this structure differed from the original model, it was considered as adequate, for it was more consistent with an experiential approach – while remaining close to social capital theory (for example, we could still talk of the four structural SC factors dealing with different kinds of social interaction).

The PCA and CFA support a good psychometric integrity of the FSCQ with very good reliability indicators, which makes of this scale a reliable and friendly-user tool to assess family social capital in adolescents. Discriminant validity analysis showed significant differences in the overall and structural FSCQ scores for rural and urban adolescents. These results support the fact that rural and urban environments provide different opportunities to interact with family members, at the time that it does not necessarily implies negative consequences for the subjective experience of one's family relation. Notwithstanding that, the establishment of construct validity is an ongoing process, and further research will be needed to refine and consolidate the FSCQ for adolescent population and for other age and sociodemographic groups.

Our study does have limitations. All our adolescent sample was 14-16y-old, thus, because adolescence is a highly variable stage (Casas, 2006; Pressley & McCormick, 2007), confirmation that this model is also suitable for other age-ranges should be empirically obtained. In the same way, our findings ought to be validated in larger cross-cultural

**Table 5**  
PCA results: factor loading above 0.5, communalities and explained variance.

	Structural FCS				Cognitive FSC			h <sup>2</sup>
	1	2	3	4	5	6	7	
v15 Playing, reading, .... With household family members			.826					.704
v16 Practising sport with household family members			.733					.599
v17 Grocery shopping household family members		.742						.615
v18 Preparing food household family members		.861						.725
v20 Eating together household family members		.583						.680
v21 Doing homework with household family members			.636					.518
v22 Speaking to family members	.800							.715
v23 Visiting OH family	.587							.632
v24 Going to the cinema, museum ... With OH family members				.796				.662
v25 Playing, reading, .... With OH family members				.790				.685
v26 Practising sport with OH family members				.701				.690
v31 Talking on the phone to OH family	.667							.559
V67 Working well as a family in the HH					.837			.680
v68 Cooperation with HH family when facing problems					.864			.769
v69 HH Family support					.847			.730
V72 Cooperation with family OH when facing problems						.902		.812
v73 OH Family support						.815		.736
v74 Following the rules among family OH						.877		.713
V76 Conflicting goals among HH family members							.830	.684
V77 Frequent arguing with HH family members							.867	.762
v82 Criticism among OHfamily membres							.866	.762
Factor eigenvalues	1.205	1.321	2.261	4.894	1.899	2.354	4.045	
% explained factor variance	8.71	9.48	15.24	31.31	15.98	21.69	36.38	
% explained scale variance	64.860				74.043			

samples, as what is considered as *family* differs considerably among cultures. In order to do so, idiomatic and cultural adaptation of the questionnaire should be performed. Future research also includes validation in larger samples and testing with modern psychometric techniques.

Finally, we suggest that while the FSCQ score provides an overall assessment of family social capital, caution is necessary in its interpretation, since each factor and dimension is measuring a different domain of social capital, and a global high score might be blurring low FSC in some areas – which from an intervention point of view may be interesting to detect. In this sense, using the different factors’ score may be more informative, useful and valid, as they provide information about the specific pathways that may link social capital with the outcome of study, which constitutes a relevant and largely claimed knowledge for the advance of research on social capital (Carrillo & Riera, 2017; Moore & Kawachi, 2017). When applied in public health research, it should not be forgotten that higher levels of social capital do not necessarily entail health benefits (Carrillo-Álvarez, Kawachi, & Riera-Romaní, 2019; Villalonga-Olives & Kawachi, 2017).

The FSCQ is a new tool available for public health and social practitioners and researchers. There is consistent evidence that the study of the family context from a social capital approach can contribute in promoting adolescents’ health. In this direction, the development and validation of an instrument to assess family social capital in

a reliable manner is an added value to the field that will allow to assess the need for, and the effectiveness of potential future interventions addressed at improving family social capital. The application of such tools in different cultural context may also allow to detangle the influence of socio-political and cultural aspects on both, social capital and health.

**Conflicts of interest**

The authors declare no conflict of interest.

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**Ethical approval**

The research described in this paper is part of a project revised and approved by the Ethics Committee of the Faculty of Psychology, Education and Sports Sciences Blanquerna, Universitat Ramon Llull (25/01/2015).

**Table 6**  
Consistency, descriptive parameters and correlations between factors of the FSCQ.

Component	Alpha	Mean	SD	1	2	3	4	5	6	7
<i>Structural FSC</i>	.789	29.99	10.563							
1 Communication	.634	10.1143	3.31465	1.000						
2 Shared Food	.666	8.1918	3.33633	.246	1.000					
3 Shared Leisure HH	.675	7.0490	4.38487	.150	.280	1.000				
4 Shared Leisure OH	.788	4.3347	3.64093	.131	.014	.161	1.000			
<i>Cognitive FSC</i>	.792	22.91	6.773							
5 Cohesion HH	.725	3.6245	3.45667					1.000		
6 Cohesion OH	.837	10.3020	3.48042					.348	1.000	
7 Conflicts	.815	8.5918	4.38476					-.140	-.197	1.000
TOTAL FSC	.822	55.93	15.250							



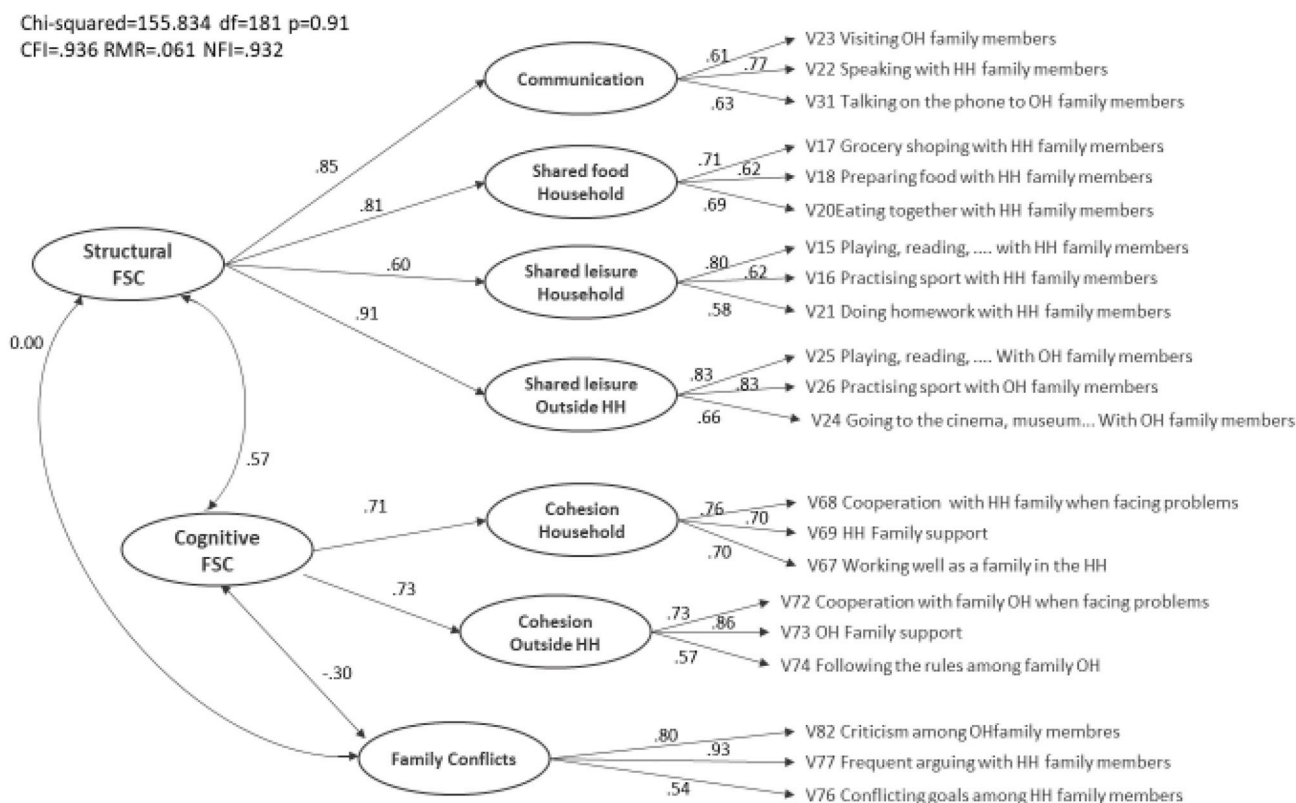


Fig. 2. Results of the CFA analysis.

Table 7  
Mean scores and standard deviation.

	Rural	Urban
Factor1_Communication	0.5294(0.50)	0.5985(0.49)
Factor2_SharedFood**	5.2294(4.05)	3.85(3.33)
Factor3_LeisureHH**	10.9824(2.98)	9.83(3.43)
Factor4_LeisureOH*	8.2529(3.47)	7.3745(4.01)
Factor5_CohesionHH	11.11(3.25)	10.6293(3.52)
Factor6_CohesionOH	9.1824(4.14)	8.5367(4.16)
Factor7_FamilyConflict	3.8709(3.35)	3.6255(3.26)
Structural FSC**	33.7118(9.59)	30.6332(10.80)
Cognitive FSC	16.4176(7.75)	15.5405(7.60)
Total FSC**	50.1294(12.98)	46.1737(14.72)

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2019.100453>.

References

Bala-Brusilow, C. (2010). *A study of the associations between childhood obesity and three forms of social capital*. Wayne State University.

Bourdieu, P. (1986). The forms of capital. *Handbook of theory and research for the sociology of education: Vol. 241*, (pp. 241–258). . <https://doi.org/10.1002/9780470755679.ch15>.

Cabrera-Nguyen, P. (2010). Author guidelines for reporting scale development and validation results in the journal of the society for social work and research. *Journal of the Society for Social Work and Research*, 1(2), 99–103. <https://doi.org/10.5243/jsswr.2010.8>.

Carrillo-Álvarez, E., Kawachi, I., & Riera-Romaní, J. (2019). Neighbourhood social capital and obesity: A systematic review of the literature. *Obesity Reviews*, 20, 119–141. <https://doi.org/10.1111/obr.12760>.

Carrillo, E., Kawachi, I., & Riera, J. (2017). Family social capital and health: A systematic review and redirection. *Sociology of Health & Illness*, 39(4).

Carrillo, E., & Riera, J. (2017). Measuring social capital: Further insights. *Gaceta Sanitaria*, 31, 57–61. <https://doi.org/10.1016/j.talanta.2011.11.033>.

Casas, J. (2006). Conceptos esenciales de la adolescencia. Criterios cronológicos, físico-

funcionales, psicológicos y sociales. *Medicine*, 61(3931), 3937.

Coleman, J. S. P. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94(S1), S95–S120. <https://doi.org/10.1086/228943>.

DeVellis, R. (2017). *Scale development: Theory and applications* (4th ed.). Thousand Oaks, CA: SAGE Publications. <https://doi.org/10.1017/CBO9781107415324.004>.

Donati, P., & Prandini, R. (2007). Family and social capital: European contributions. *International Review of Sociology/Revue Internationale de Sociologie*, 17(2), 205–208. <https://doi.org/10.1080/03906700701356770>.

European Communities (2003). *The social situation in the European Union 2003*. Luxembourg.

Fabrigar, L. R., & Wegener, D. T. (2012). *Exploratory factor analysis*. Oxford University Press.

Ferlander, S., Ma, I. H., Maekinen, I. H., & Ma, I. H. (2009). Social capital, gender and self-rated health: Evidence from the moscow health survey 2004. *Social Science & Medicine*, 69(9), 1323–1332. <https://doi.org/10.1016/j.socscimed.2009.08.009>.

Fukuyama, F. (1999). Social capital and civil society. *Public policy* (pp. 1–13).

Furstenberg, F. F., & Hughes, M. E. (1995). Social capital and successful development among at-risk youth. *Journal of Marriage and Family*, 57(3), 580–592. <https://doi.org/10.2307/353914>.

Greiner, K. A., Li, C., Kawachi, I., Hunt, D. C., & Ahluwalia, J. S. (2004). The relationships of social participation and community ratings to health and health behaviors in areas with high and low population density. *Social Science & Medicine*, 59(11), 2303–2312. <https://doi.org/10.1016/j.socscimed.2004.03.023>.

Han, Y. (2012). *Mental health and health-risk behaviors in adolescence: An examination of social relationships*. University of Michigan.

Harpham, T., Grant, E., & Thomas, E. (2002). Measuring social capital within health surveys: Key issues. *Health Policy and Planning*, 17(1), 106–111. <https://doi.org/10.1093/heapol/17.1.106>.

Helliwell, J. F., & Putnam, R. D. (2004). The social context of well-being. *The Science of Well-Being*, 359(1449), 1435–1446. <https://doi.org/10.1098/rstb.2004.1522>.

IDESCAT (2013). *Renda familiar disponible bruta. Comarques i municipis*. Retrieved from <http://www.idescat.cat/pub/?id=aec&n=941>.

Izquierdo Alfaro, L., Olea Díaz, J., & Abad, F. J. (2014). Exploratory factor analysis in validation studies: Uses and recommendations. *Psicothema*, 26(3), 395–400. <https://doi.org/10.7334/psicothema2013.349>.

Jokinen-Gordon, H. (2007). *State of being: An analysis of risk and capital among Arkansas youth*. University of Arkansas.

Kawachi, I., & Berkman, L. (2000). Social cohesion, social capital and health. In L. Berkman, I. Kawachi, & M. Glymour (Eds.). *Social epidemiology* (pp. 174–190). (2nd ed.). New York, NY: Oxford University Press, UK.

Kawachi, I., Subramanian, S. V., & Kim, D. (2010). Social capital and health: A decade of progress and beyond. In I. Kawachi, S. V Subramanian, & D. Kim (Eds.). *Social capital and health* (pp. 1–26). New York, NY: Springer.

Keating, N., & Dosman, D. (2009). Social capital and the care networks of frail seniors. *Canadian Review of Sociology*, 46(4), 301–318.

- Litwin, H. (2011). The association between social network relationships and depressive symptoms among older Americans: What matters most? *International Psychogeriatrics*, 51(3), 379–388.
- Litwin, H., & Shiovitz-ezra, S. (2010). Social network type and subjective well-being in a national sample of older Americans. *The Gerontologist*, 51(3), 379–388. <https://doi.org/10.1093/geront/gnq094>.
- Litwin, H., & Stoeckel, K. J. (2014). Confidant network types and well-being among older Europeans. *The Gerontologist*, 54(5), 762–772. <https://doi.org/10.1093/geront/gnt056>.
- MacKenzie, S. B., & Podsakoff, P. (2005). The problem of measurement model misspecification in behavioral and organizational research and some recommended solutions. *Journal of Applied Psychology*, 90(4), 710–730.
- Meissner, H., Creswell, J., Klassen, A. C., Plano, V., & Smith, K. C. (2011). Best practices for mixed methods research in the health Sciences. *Methods*, 29, 1–39.
- Moore, S., & Kawachi, I. (2017). Twenty years of social capital and health research: A glossary. *Journal of Epidemiology & Community Health*, 71(5), 513–517. <https://doi.org/10.1136/jech-2016-208313>.
- Morales, P. (2000). *Medición de actitudes en psicología y educación. Construcción de escalas y problemas metodológicos*. Madrid: Universidad Pontificia de Comillas.
- Morgan, A., & Haglund B. J. A. O. J. A. (2009). Social capital does matter for adolescent health: Evidence from the English HBSC study. *Health Promotion International*, 24(4), 363–372. <https://doi.org/10.1093/heapro/dap028>.
- Morgan, A. R., Rivera, F., Moreno, C., & Haglund, B. J. A. (2012). Does social capital travel? Influences on the life satisfaction of young people living in England and Spain. *BMC Public Health*, 12(1), 138. <https://doi.org/10.1186/1471-2458-12-138>.
- Moxley, R. L., Jicha, K. A., & Thompson, G. H. (2011). Testing the importance of family solidarity, community structure, information access, and social capital in predicting nutrition health knowledge and. *Food Choices in the Philippines*, 50(3), 215–239.
- Newton, K. (2001). Trust, social capital, civil society, and democracy. *International Political Science Review*, 22, 201–214. <https://doi.org/10.1177/0192512101222004>.
- Patton, G. C., Coffey, C., Cappa, C., Currie, D., Riley, L., Gore, F., ... Ferguson, J. (2012). Health of the world's adolescents: A synthesis of internationally comparable data. *Lancet (London, England)*, 379(9826), 1665–1675. [https://doi.org/10.1016/S0140-6736\(12\)60203-7](https://doi.org/10.1016/S0140-6736(12)60203-7).
- Pettit, B., & McLanahan, S. (2003). Residential mobility and children's social capital: Evidence from an experiment. *Social Science*, 4(84), 632–649. <https://doi.org/10.1111/1540-6237.8403009>.
- Porta, M. (2014). In M. Porta (Ed.). *A dictionary of epidemiology* (6th ed.). New York: Oxford University Press.
- Prandini, R. (2007). Family's social capital: Definition, measurement and subsidies. *Sociologia e Politiche Sociali*, 10(1), 41–74.
- Pressley, M., & McCormick, C. B. (2007). *Child and adolescent development for educators. Child and Adolescent Development for Educators*. New York, NY: The Guilford Press.
- Putnam, R. D. (1995). Bowling Alone: America's declining social capital. *Journal of Democracy*, 1, 65–78. <https://doi.org/10.1353/jod.1995.0002>.
- Ravanera, Z. R., & Rajulton, F. (2010). Measuring social capital and its differentials by family structures. *Social Indicators Research*, 95(1), 63–89. <https://doi.org/10.1007/s11205-009-9450-9>.
- Reiner, R. C., Olsen, H. E., Ikeda, C. T., Echko, M. M., Ballesterros, K. E., & Manguerra, H. (2019). Diseases, injuries, and risk factors in child and adolescent health, 1990 to 2017. *JAMA Pediatrics*, 173(6), e190337. <https://doi.org/10.1001/jamapediatrics.2019.0337>.
- Riera, J. (2011). Les famílies i les seves relacions amb l'escola i la societat davant del repte educatiu, avui. *Educació social. Revista d'intervenció socioeducativa*, (49), 11–24.
- Rothan, C., Goodwin, L., & Stansfeld, S. (2012). Family social support, community "social capital" and adolescents' mental health and educational outcomes: A longitudinal study in England. *Social Psychiatry and Psychiatric Epidemiology*, 47, 697–709. <https://doi.org/10.1007/s00127-011-0391-7>.
- Runyan, D. K., Hunter, W. M., Socolar, R. R., Amaya-Jackson, L., English, D., Landsverk, J., ... Mathew, R. M. (1998). Children who prosper in unfavorable environments: The relationship to social capital. *Pediatrics*, 101(1 Pt 1), 12–18.
- Sørensen, J. F. L. (2016). Rural–urban differences in bonding and bridging social capital. *Regional Studies*, 50(3), 391–410. <https://doi.org/10.1080/00343404.2014.918945>.
- Tobiasz-Adamczyk, B., & Zawisza, K. (2017). Urban-rural differences in social capital in relation to self-rated health and subjective well-being in older residents of six regions in Poland. *Annals of Agricultural and Environmental Medicine*, 24(2), 162–170. <https://doi.org/10.26444/aaem/74719>.
- United States Census Bureau (2011). *America's families and living arrangements: 2011*. Retrieved from <https://www.census.gov/hhes/families/data/cps2011.html>.
- Van Deth, J. W. (2003). *Measuring social capital: Orthodoxies and continuing controversies*. *International journal of social research methodology*. <https://doi.org/10.1080/136455703050507>.
- de Vet, H. C. W., Adèr, H. J., Terwee, C. B., & Pouwer, F. (2005). Are factor analytical techniques used appropriately in the validation of health status questionnaires? A systematic review on the quality of factor analysis of the SF-36. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 14(5), 1203–1218 discussion 1219–21, 1223–1224.
- Villalonga-Olives, E., & Kawachi, I. (2015). The measurement of social capital. *Gaceta Sanitaria/S.E.S.P.A.S.*, 29(1), 62–64. <https://doi.org/10.1016/j.gaceta.2014.09.006>.
- Villalonga-Olives, E., & Kawachi, I. (2017). The dark side of social capital: A systematic review of the negative health effects of social capital. *Social Science & Medicine*, 194, 105–127. <https://doi.org/10.1016/J.SOCSCIMED.2017.10.020>.
- Widmer, E. D., Kempf-Constantin, N., Robert-Tissot, C., Lanzi, F., & Carminati, G. G. (2008). How central and connected am I in my family? Family-based social capital of individuals with intellectual disability. *Research in Developmental Disabilities*, 29(2), 176–187. <https://doi.org/10.1016/j.ridd.2007.02.005>.
- Widmer, E. D., Kempf, N., Sapin, M., & Galli-Carminati, G. (2013). Family beyond parents? An exploration of family configurations and psychological adjustment in young adults with intellectual disabilities. *Research in Developmental Disabilities*, 34(1), 207–217. <https://doi.org/10.1016/j.ridd.2012.07.006>.
- Wu, Q., Xie, B., Chou, C.-P. P., Palmer, P., Gallaher, P., & Johnson, C. A. (2010). Understanding the effect of social capital on the depression of urban Chinese Adolescents: An integrative framework. *American Journal of Community Psychology*, 45, 1–16. <https://doi.org/10.1007/s10464-009-9284-2>.