

Psychometric assessment of the cultural capacity scale Spanish version in Chilean nursing students

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Aim: To assess the psychometric properties of the Cultural Capacity Scale Spanish version in Chilean nursing students.

Background: The increased diversity in healthcare facilities and the current shortage of local nursing workforce in Chile present a significant challenge to the nursing education to train future competent local nurses. To facilitate cultural competence development among Chilean nursing students, it is necessary to regularly assess their cultural competence, which necessitates a culturally adapted valid and reliable tool.

Methods: A convenience sample of 502 Chilean nursing students was surveyed in this cross-sectional study using the culturally adapted scale. Reliability of the instrument was established by internal consistency and stability reliability, while validity was established by content and construct.

Results: The Cronbach's α value of the entire scale was 0.95, and the test-retest reliability was 0.85. The Corrected Item-Total Correlations ranged from 0.45 to 0.78. The tool manifested an excellent content and construct validity. The exploratory factor analysis confirmed a single factor of the scale.

Discussion: The tool demonstrated evidence of internal consistency, stability reliability, content validity and construct validity. The study provided cross-cultural evidence for the potential application of this scale in Chile and other Spanish-speaking countries.

Conclusion: The Cultural Capacity Scale Spanish version demonstrated sound psychometric properties for assessing the cultural competence of Chilean nursing students.

Limitations: The sample was restricted to one university, and the tool was only used in Chilean nursing students.

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Conflict of interest

No conflict of interest has been declared by the authors.

Implications for nursing policy: The establishment of the Spanish version of the tool will facilitate accurate and timely monitoring of the cultural competence among Chilean nursing students and other Spanish-speaking nursing students and nurses, which can inform the creation of nursing policies aimed at ensuring cultural competence development.

Keywords: Chile, Cultural Capacity Scale, Cultural Competence, Nursing Education, Nursing Students, Psychometric Assessment, Scale Development, Transcultural Nursing

Introduction

The world is experiencing a steady rise in global migration, with about 214 million international and 740 million internal migrants (Oberoi et al. 2013). In Chile, the migration rate has tripled to a 2.3% of the Chilean population over the last 12 years. Besides, 61.4% of this population lives in the Metropolitan Region, where Peruvian, Argentinian, Bolivian and Haitian community coexist (Pedemonte & Dittborn 2016). There is also a long history multicultural coexistence of indigenous ethnic groups, such as Mapuche, Rapa Nui and Aymara populations, which are part of the Chilean cultural context (Hasen Narváez 2012). This situation results in increased diversity in an already multi-ethnic population of the country, which also enriches the diversity in the cultural profile and health perspectives of the patients. With the rich cultural diversity, the Chilean government established state reforms of respect to cultural diversity, which integrate cultural diversity in policies in various sectors, including health care and education, hence reducing inequalities (Becker 2013).

The current state of the nursing profession in Chile suggests that the country is experiencing a shortage of nursing workforce. According to the Organization for Economic Co-operation and Development (OECD 2015), the number of nurses in the country in 2013 (5.6 nurses per 1000 population) was lower than the OECD average of 9.1 nurses per 1000 population, with only 53 new nursing graduates per 100 000 population. This situation resulted in the immigration of nurses from different countries to suffice the needed nursing workforce (Siantz & Malváez 2008). These foreign nurses, however, are confronted with several issues and challenges in the performance of their nursing duties, such as difficulties in communication and in relating to the cultural aspects of the patients (Rodríguez et al. 2014). Hence, one could assume that local nurses can provide a more culturally appropriate nursing care to Chilean patients due to their shared language, religion, and culture.

The increased diversity in healthcare facilities, the current shortage of local nursing workforce and the government's mandate to respect cultural diversity in health care and education present significant challenges to the health-related

professions in the country, particularly to nurses who are the frontline staffs across the health continuum. These issues also place immense pressure on the nursing education to effectively train future local nurses who are capable of providing culturally sensitive and competent nursing care. The significance of cultural competence development among healthcare workers is underscored to eradicate racial or ethnic disparities in healthcare settings (Campinha-Bacote 2011). However, concepts on how to deal successfully with such diversity in nursing care facilities from an intercultural perspective have not been included in the healthcare curricula in the country (Painemilla et al. 2013). This phenomenon does not differ significantly in nursing undergraduate programmes, where the knowledge about the cultures of those people is left out of the exit competency criteria of nurses (Ibarra Mendoza & González 2006; Moreno & Klijn 2011).

When inquiring about the facilitators in the implementation of the Chilean intercultural healthcare policy, the role of the professional teams is observed as outstanding regarding the tasks associated with the performance of this policy. As an obstacle, a lack of management models underpinning this operationalization is perceived (Pérez et al. 2016). Thus, so as to assure an appropriate implementation of the national intercultural healthcare policy regarding the professional performative role of the nurses, nursing policies on transcultural nursing should be formulated and implemented both in nursing education and nursing practice to ensure the continuous development of cultural competence among nursing students and nurses in the country.

Therefore, the establishment of the Cultural Capacity Scale Spanish version is very critical in the nursing education and practice in Chile and other Spanish-speaking countries. The tool can assist in identifying the strengths and weaknesses of Chilean nursing students in providing culturally competent nursing care. Hence, appropriate policies and interventions can be formulated and implemented to ensure cultural competence development. This study therefore was conducted to assess the psychometric properties of the Cultural Capacity Scale Spanish version (CCS-S) in Chilean nursing students.

Method

Study design

This study employed a descriptive, cross-sectional design.

Sample and setting

The study was conducted in the Universidad Autonoma de Chile, Santiago Campus. A convenience sample of 502 Baccalaureate in nursing (BSN) students was included in this study (response rate = 77.2%). The students were included if they met the following inclusion criteria: (1) full-time BSN student, (2) registered in second to fourth-year level, (3) with previous or current clinical exposures, and (4) voluntarily indicated their intention to participate. First-year nursing students were excluded in the psychometric study because of their lack of clinical or community exposure. However, a sample of at least 30 first-year nursing students was included in the pilot testing of the instrument.

Instrument

A self-administered questionnaire, with two sections, was used to collect data from the respondents. The first section was tailored to collect data on the demographic characteristics and cultural-related experiences of the respondents. The respondents' characteristics included age, gender and academic level. Cultural-related experiences included prior diversity training, an experience of taking care of patients with diverse cultural background and patients belonging to special population groups in the last 12 months, and residential environment.

The second section was the Cultural Capacity Scale (CCS) by Perng & Watson (2012). This 20-item scale was derived from a Mokken scaling analysis of the Nurse Cultural Competence Scale (NCCS). The scale consists of 12 statements that reflect cultural skills, six statements that are related to cultural knowledge, and two cultural sensitivity statements. The items measure individual's abilities that can be practised during nursing care. The scale employs a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The scores can range from 20 to 100, with higher scores indicating higher levels of cultural competence. The CCS demonstrated acceptable reliability and validity (Perng & Watson 2012).

The CCS was culturally adapted to Chilean culture and language following a cross-cultural adaptation process (Gjersing et al. 2010). The CCS English version was translated independently to Spanish by two bilingual Chilean national experts. A third bilingual Chilean national synthesized the two independent translations to form a single tentative Spanish version. After that, the synthesized translation version was back-

translated by two bilingual translators. The two back-translated versions were synthesized by a third translator to produce a single back-translated version. The translated version and the back-translated version were presented to a five-member panel of experts to examine the similarity of both versions. After that, the tentative CCS-S was tested for content validity by the panel. The CCS-S subjected to pilot test to 30 nursing students belonging to the first-year level. The respondents were asked to answer the questionnaire and provide their comments on the paper attached regarding the difficult-to-comprehend words or sentences. No changes were integrated into the tool thus the final version of the CCS-S was formed.

Data collection

Data collection was performed from May to October 2016 by two of the researchers. The questionnaire was distributed after the respondents have signed the informed consent. Codes were provided to each respondent to be able to compare the surveys of the test and re-test. Approximately 15–20 min were given to the respondents to complete the questionnaire. Two weeks after the first data collection, the CCS-S was redistributed to the respondents following the codes. The same procedure was strictly followed in the second data collection.

Ethical consideration

The study protocol was approved by the Institutional Review Board of Universidad Autonoma de Chile (No. 010-16). Respondents' rights were ascertained before handing them the questionnaire by giving them full disclosure of their rights as participants, the nature and risk of the study, and the benefits. The respondents' confidentiality was ascertained throughout the research process.

Statistical analysis

The statistical analyses were conducted utilizing the statistical software, SPSS version 22. The demographic characteristics, cultural-related experiences and cultural competence of the respondents were analysed using descriptive statistics.

The Cronbach's α of the scale was calculated to demonstrate its internal consistency reliability (α value ≥ 0.70), while the intraclass correlation coefficient (ICC) of the 2-week test-retest scores (ICC ≥ 0.80) was computed for its stability reliability (Nunnally & Bernstein 1994; Vincent 1999).

For validity, content and construct validities were examined. The item-level content validity index (I-CVI) and scale-level content validity index average method (S-CVI/Ave) were used to examine the content validity. An I-CVI value of 1 for

a panel with ≤ 5 members and an S-CVI/Ave ≥ 0.90 was acceptable (Polit & Beck 2006). The item-total correlation (ITC) was calculated to establish the internal construct validity. The items with corrected ITC value between 0.30 and 0.80 and corrected ITC that did not cause $\geq 10\%$ drop in the computed Cronbach's alpha of the CCS-S if the item is deleted were retained (DeVellis 2003; Nunnally & Bernstein 1994). An exploratory factor analysis (EFA) using the principal component analysis (PCA) with varimax rotation was performed to assess the construct validity further. The factor with an Eigenvalue greater than 1 and factor loading of greater than 0.40 was determined for construct validity (DeVellis 2003). The Kaiser–Meyer–Olkin (KMO) and Bartlett's test of sphericity were calculated to determine the sample size adequacy (KMO value ≥ 0.60) and the appropriateness of the factor model ($P < 0.05$), respectively. Testing of the theoretical relationships was performed by independent samples *t*-test and one-way analysis of variance with post hoc Tukey HSD test, as appropriate. *P*-values less than 0.05 were considered significant.

Results

The mean age of the respondents was 23.18 ± 3.36 years, and the majority was female (82.3%). More than a third of the respondents were in the second year of the BSN programme (41.4%), while 27.5% and 31.1% were registered in the third and fourth years, respectively. Regarding cultural-related experiences, the majority of the students had prior cultural diversity training (57.6%) and had experienced providing care to patients belonging to special population groups in the last 12 months (73.5%). Contrarily, the majority of the respondents did not experience providing nursing care to patients from other race or ethnicity in the last 12 months (77.3%) and were not living in an environment with culturally diverse people (54.4%, see Table 1).

Reliability of the CCS-S

The Cronbach's α value of the entire scale was 0.95. The computed Cronbach's alpha indicates excellent internal consistency reliability of the scale. For the stability reliability, only 255 of the 502 questionnaires were returned in the second data collection. Thus, 255 respondents were used to compute the ICC. The computed ICC value was 0.85. This implies that the CCS-S was capable of measuring consistent cultural competence among nursing students over time.

Validity of the CCS-S

The I-CVIs and the S-CVI average values of the CCS-S were both 1. Both the computed I-CVIs and S-CVI indicate that

Table 1 Demographic characteristics and cultural-related experiences of the respondents ($n = 502$)

Demographics	Mean	SD
Age	23.18	3.36
	n	%
Gender		
Male	89	17.7
Female	413	82.3
Academic level		
Second year	208	41.4
Third year	138	27.5
Fourth year	156	31.1
Cultural-related experiences		
Prior diversity training		
Yes	289	57.6
No	213	42.4
Taken care of a patient from other race or ethnic group in the past 12 months		
Yes	114	22.7
No	388	77.3
Live in an environment with people with diverse race/ethnicity		
Yes	229	45.6
No	273	54.4
Taken care of patients belonging to special population groups in the past 12 months		
Yes	369	73.5
No	133	26.5

each item in the scale and the entire scale in general represent all facets of cultural competence. The 20 items were entered in a PCA with varimax rotation (see Table 2). The KMO index was 0.95, and Bartlett's test of sphericity was significant ($P < 0.001$). The computed KMO index signified that the sample size was adequate for factor analysis, while the Bartlett's test of sphericity indicated that the factor model was appropriate. The computed corrected ITC ranged from 0.454 to 0.780. None of the items cause $\geq 10\%$ drop in the computed Cronbach's alpha of the CCS-S if the item is deleted; hence, all 20 items were retained. The PCA revealed a single factor with a cumulative contribution rate of 52.2%. This implies that the scale measures the cultural competence construct adequately.

The bivariate analyses on the cultural competence of the respondents were reflected in Table 3. The cultural competence significantly varies between academic levels of the students as revealed by the ANOVA ($F(2, 499) = 37.02$, $P < 0.001$). The Tukey HSD tests indicated that fourth-year

Table 2 Item mean, factor loadings, corrected item-total correlations and Cronbach's α if item deleted for the CCS-S ($n = 502$)

Scale item	Mean $\pm$ SD	Factor loading	Corrected item-total correlation	Cronbach's α if item is deleted
16. I can establish nursing goals according to each client's cultural background	3.54 $\pm$ 1.10	0.809	0.780	0.947
7. I can teach and guide other nursing colleagues about the cultural knowledge of health and illness	3.52 $\pm$ 1.10	0.782	0.750	0.947
14. When implementing nursing activities, I can fulfil the needs of clients from diverse cultural backgrounds	3.56 $\pm$ 1.08	0.768	0.738	0.948
15. I can explain the possible relationships between the health/illness beliefs and culture of the clients	3.50 $\pm$ 1.07	0.762	0.726	0.948
8. I can teach and guide other nursing colleagues to display appropriate behaviour, when they implement nursing care for clients from diverse cultural groups	3.53 $\pm$ 1.18	0.757	0.725	0.948
4. I can teach and guide other nursing colleagues about the communication skills for clients from diverse cultural backgrounds	3.43 $\pm$ 1.09	0.750	0.715	0.948
6. To me collecting information on each client's beliefs/behaviour about health/illness is very easy	3.47 $\pm$ 1.07	0.746	0.713	0.948
19. I can use communication skills with clients of different cultural backgrounds	3.58 $\pm$ 1.15	0.742	0.711	0.948
5. I can explain the influences of cultural factors on one's beliefs/behaviour towards health/illness to clients from diverse ethnic groups	3.47 $\pm$ 1.08	0.741	0.704	0.948
2. I can teach and guide other nursing colleagues about planning nursing interventions for clients from diverse cultural backgrounds	3.43 $\pm$ 1.03	0.725	0.687	0.948
9. I am familiar in health- or illness-related cultural knowledge or theory	3.33 $\pm$ 1.06	0.724	0.685	0.948
1. I can teach and guide other nursing colleagues about the differences and similarities of diverse cultures	3.58 $\pm$ 1.13	0.717	0.680	0.949
10. I can explain the influence of culture on a client's beliefs/behaviour about health/illness	3.52 $\pm$ 1.09	0.716	0.680	0.949
12. I can compare the health or illness beliefs among clients with diverse cultural background	3.52 $\pm$ 1.03	0.716	0.677	0.949
11. I can list the methods or ways of collecting health-, illness, and cultural-related information	3.45 $\pm$ 1.07	0.712	0.672	0.949
3. I can use examples to illustrate communication skills with clients of diverse cultural backgrounds	3.55 $\pm$ 1.07	0.707	0.668	0.949
13. I can easily identify the care needs of clients with diverse cultural backgrounds	3.52 $\pm$ 1.03	0.688	0.648	0.949
17. I usually actively strive to understand the beliefs of different cultural groups	3.71 $\pm$ 1.19	0.683	0.645	0.949
18. When caring for clients from different cultural backgrounds, my behavioural response usually will not differ much from the client's cultural norms	3.49 $\pm$ 1.15	0.656	0.621	0.949
20. I usually discuss differences between the client's health beliefs/behaviour and nursing knowledge with each client	3.28 $\pm$ 1.07	0.490	0.454	0.952

students ($M = 77.95$, $SD = 14.07$) had significantly higher cultural competence scores than third-year ($M = 69.14$, $SD = 14.99$, $P < 0.001$) and second-year ($M = 64.62$, $SD = 14.96$, $P < 0.001$) students. On the other hand, the second-year students had significantly lower cultural competence scores than students in the third ($P = 0.015$) and fourth ($P < 0.001$) years. In terms of cultural-related experiences, nursing students who had attended prior cultural diversity training ($t = 4.16$, $P < 0.001$), had taken care of patient from other race or ethnic group in the past 12 months ($t = 5.19$, $P < 0.001$), were living in an environment with culturally diverse people ($t = 3.23$, $P = 0.001$) and had taken care of patients belonging to special population groups in the past

12 months ($t = 2.72$, $P = 0.007$) manifested significantly higher cultural competence than students who did not have similar experiences.

Discussion

The study evaluated the psychometric properties of the CCS-S in Chilean nursing students. The findings support the reliability of the tool as manifested by the computed Cronbach's alpha and ICC values above the acceptable values. Furthermore, the study reported acceptable content and construct validity of the CCS-S. The establishment of the validity and reliability of the CCS-S opens opportunities in ensuring culturally competent nursing practice.

Table 3 Differences in cultural competence by demographic characteristics and cultural-related experiences of the respondents ($n = 502$)

Demographics	Cultural competence score Mean $\pm$ SD	Statistical test	P
Age		$r = 0.06$	0.167
Gender			
Male	71.83 $\pm$ 15.22	$t = -1.21$	0.228
Female	69.61 $\pm$ 15.82		
Academic level			
Second year	64.62 $\pm$ 14.96	$F = 37.01$	<0.001***
Third year	69.14 $\pm$ 14.99		
Fourth year	77.95 $\pm$ 14.07		
Cultural-related experiences			
Prior diversity training			
Yes	72.51 $\pm$ 14.75	$t = 4.16$	<0.001***
No	66.61 $\pm$ 16.38		
Taken care of a patient from other race or ethnic group in the past 12 months			
Yes	76.56 $\pm$ 15.83	$t = 5.19$	<0.001***
No	68.08 $\pm$ 15.18		
Live in an environment with people with diverse race/ethnicity			
Yes	72.45 $\pm$ 15.85	$t = 3.23$	0.001**
No	67.95 $\pm$ 15.34		
Taken care of patients belonging to special population groups in the past 12 months			
Yes	71.19 $\pm$ 15.19	$t = 2.72$	0.007**
No	66.71 $\pm$ 16.72		

Significant at 0.01 level, *Significant at 0.001 level.

The results support the reliability of the CCS-S as indicated by its excellent internal consistency as observed by the computed Cronbach's alpha (Bolarinwa 2015). This implies that the items of the CCS-S were closely related to each other as one scale. This finding is comparable with the alpha values reported in earlier validation studies. The Turkish version (Gözüm et al. 2016) and the Arabic version (Cruz et al. 2017b) of the scale had similar Cronbach's α of 0.96. Cronbach's α is the most commonly reported measure of internal consistency in scale development. Higher computed values of Cronbach's alpha signify higher levels of reliability and hence better measurement accuracy (Sullivan 2011). To further support the scale reliability, the ICC of the 2-week test-retest scores revealed acceptable value. This suggests that the scale was capable of measuring cultural competence of the Chilean nursing students consistently in two separate measurements, thus supporting its stability reliability over time. This finding is consistent with the findings reported in the independent psychometric evaluation studies of the CCS by Cruz et al.

(2017b) and Gözüüm et al. (2016). The acceptable Cronbach's α and the ICC values revealed by this study support the reliability of the CCS-S in measuring the cultural competence of Chilean nursing students.

The CCS-S validity was backed up by establishing the content validity and construct validity using EFA and theoretical relationship testing. For the scale content validity, the I-CVIs and S-CVI/Ave of the scale were within the acceptable values, thus supporting its excellent content validity. It also suggests that each item in the CCS-S was conceptually and culturally relevant in measuring cultural competence among Chilean nursing students. On another note, the EFA revealed a single-factor scale with a computed cumulative contribution rate of 52.2% and with factor loadings within an acceptable range. This signifies that the CCS-S had good construct validity when used among Chilean nursing students. According to Tabachnick & Fidell (2007), a good construct validity of the scale can be manifested by a cumulative contribution rate of higher than 50% and sufficient factor loadings. Moreover, this study supports the unidimensionality of the scale, which is consistent with earlier psychometric studies (Cruz et al. 2017b; Gözüüm et al. 2016; Perng & Watson 2012). Using a Moken scaling, Perng & Watson (2012) reported that the characteristics of the CCS as being unidimensional and its hierarchy of items make the scale unique from other tools assessing similar concept. The items of the scale contain activities that can be practised by the nursing students during nursing activities.

The validity of the CCS-S was further supported by findings of the bivariate analyses conducted in the cultural competence of the respondents. This was undertaken to test the theoretical relationships of the CCS-S. As indicated, Chilean nursing students who were registered in the fourth year had higher cultural competence than those in the second and third year. Contrarily, second-year nursing students had poorer cultural competence as compared with students in the more senior year. These findings are similar to the results reported in earlier studies. Using the same instrument, Cruz et al. (2016) found that Filipino BSN students who were in the latter years of the programme had better cultural competence than those in the second year. Similarly, graduating nursing students in the USA demonstrated better cultural-related awareness, sensitivity and behaviours than those beginning nursing students (Reyes et al. 2013). Furthermore, earlier studies have reported that cultural-related experiences of nursing students have an effect on the development of their cultural competence. It was indicated that students who had previous exposure to patients with different culture and beliefs, as well as patients belonging to special population

groups, had higher cultural competence than students without similar experience. Moreover, students who had prior diversity training and who were living in an environment with rich cultural diversity had higher cultural competence (Cruz et al. 2016, 2017b; Gözüml et al. 2016). These are similar to the findings of the study using the CCS-S, thus further support the tool's validity.

This study has some acknowledged limitations. First, the CCS-S was only psychometrically assessed among Chilean nursing students; hence, future study should be conducted to evaluate the tool's psychometric properties in other groups, including practicing nurses. Second, confirmatory factor analysis was not conducted; it is recommended that such analysis should be performed to support the current findings. Third, construct validity was only established using EFA and testing of the theoretical relationships. Other methods of establishing validity should be utilized in future studies. Nevertheless, this study contributes immensely to the efforts of ensuring culturally competent nursing care.

Conclusion

The findings demonstrated good validity and reliability of the tool when used in Chilean nursing students, thus supporting its sound psychometric properties. The CCS-S is a valid and reliable tool that can be accurately and conveniently utilized in assessing the cultural competence of Chilean nursing students and can potentially be used for other Spanish-speaking nursing students and nurses. The scale can also be used and tested for various settings in Chile and other Spanish-speaking countries using other population groups, such as practising nurses. This will facilitate wider use of the tool and will allow cross-cultural comparisons, which could enrich the literature of cultural competence in nursing practice and education in that part of the world.

Implications to nursing and nursing policy

The current affairs of migration and the increasing cultural diversity in Chile and other parts of the world have significant impacts on the healthcare delivery systems as a result of the different beliefs, values and life experiences of patients with diverse cultural backgrounds. This situation demands the integration of cultural competence in all nursing care encounters in all levels of health care. Health policies should adapt culturally competent care as one of the priorities; hence, creating interventions that are proven to be effective in improving cultural competence of nurses and nursing students, such as cultural diversity training programmes, culturally focused educational programmes for patients, interpreter services, patient navigators and immersion programmes (Truong et al. 2014). Universities in Chile offering

nursing programme should collaborate and create a national nursing policy that would mandatorily integrate local and international cultural-related concepts in the nursing curriculum both in the theoretical and practical aspects of nursing throughout the nursing programme. Incorporating cultural competence topics in the pre-licensure curriculum will ensure the continuous development of the cultural competence of nursing students, thus facilitating the provision of culturally sensitive and competent care of nursing students to their patients (Cruz et al. 2017a). With the use of this tool, nurse educators can follow through the development of the students' cultural competence. The CCS-S can facilitate the identification of the students' strengths and weaknesses in providing culturally competent care, as well as the assessment of peculiar concerns that are unique to the country's culture, which can inform the creation of an appropriate nursing education policy geared towards ensuring the highest level of quality nursing education. Furthermore, nursing administrators of hospitals in Chile and other Spanish-speaking countries can benefit from the establishments of the CCS-S by utilizing it to assess nurses' cultural competence, which can form basis for developing nursing policies that establishes standards of practice for culturally competent nursing care that integrates socially and culturally relevant contexts of the country and considers the nurses' capabilities in providing culturally competent care.

Author contributions

Study design: JPC, FAMC, JEOL, CAZA, LMV

Cultural adaptation of the scale: FAMC, JEOL

Data collection: FAMC, CAZA

Data analysis: JPC

Study supervision: JPC

Manuscript writing: JPC, LMV

Critical revisions for important intellectual content: JPC, FAMC, JEOL, CAZA, LMV

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