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Validation of the Appraisal of Self-care Agency Scale (ASA) in Chilean adolescents

Validação da Escala de Avaliação de Agências de Autocuidado (ASA) em adolescentes chilenos

Validación de escala de Valoración de Agencia de Autocuidado (ASA) en adolescentes chilenos

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Abstract

Objective: To perform validation and reliability analysis of the Self-Care Agency Assessment Scale in Chilean adolescents. **Method**: It was performed in 199 adolescents. Validation of content was done by expert review. The reliability and construct validity were explored by means of exploratory factorial analysis (AFE) and confirmatory factorial analysis (AFC). **Results**: Some terms of the scale were culturally adapted. Cronbach's alpha reliability of the 24-item scale was 0.88. The items 6, 11 and 20 presented low reliability and correlation with the scale (<0.4). The AFE suggested a factorial solution of five factors and one factor per graph of sedimentation. The structural equations of the possible models resulted in values of adjustment indices, close to satisfactory. **Conclusions and Implications for Practice**: By considering the combination of objective criteria, those based on theory and on the interpretability of factor solutions, the optimal solution is that of a factor with 21 items. The scale presents items adapted culturally, it is proposed to incorporate a greater specificity of self-care behaviors typical of adolescents. New research evaluating interventions to improve self-care capacity in adolescents could use the new version of the ASA scale with better psychometric properties.

Keywords: Validation Studies; Self Care; Adolescent.

Resumo

Objetivo: Realizar validação e análise de confiabilidade da Escala de Classificação da Agência de Autocuidado em adolescentes chilenos. **Método**: Aplicado a 199 adolescentes. Validação de conteúdo foi feita por revisão de especialistas. Confiabilidade e validade de construto foram exploradas por meio de análise fatorial exploratória (AFE) e análise fatorial confirmatória (AFC). **Resultados**: Alguns termos da escala foram culturalmente adaptados. A confiabilidade alfa de Cronbach da escala de 24 itens foi de 0,88. Os itens 6, 11, 20 apresentaram baixa confiabilidade e correlação com a escala (<0,4). O AFE sugeriu numa solução fatorial de cinco fatores e um fator por gráfico de sedimentação. As equações estruturais dos modelos possíveis resultaram com valores de índices de ajuste, próximos do satisfatório. **Conclusões e Implicações para a Prática:** Considerando a combinação de critérios objetivos, aqueles baseados na teoria e na interpretabilidade das soluções fatoriais, a solução ótima é a de um fator com 21 itens. A escala apresenta itens culturalmente adaptados, propõe-se incorporar comportamentos de autocuidado mais específicos típicos de adolescentes. Novas pesquisas avaliando intervenções voltadas para melhorar a capacidade de autocuidado em adolescentes *poderiam* utilizar a nova versão da escala ASA com melhores propriedades psicométricas.

Palavras-chave: Estudos de Validação; Autocuidado; Adolescente.

Resumen

Objetivo: Realizar validación y análisis de confiabilidad de la Escala de Valoración de Agencia de Autocuidado en adolescentes chilenos. **Método**: Fue realizado en una muestra 199 adolescentes. La validación de contenido se hizo por revisión de expertos. Se exploró la confiabilidad y la validez de constructo por medio de análisis factorial exploratorio (AFE) y confirmatorio (AFC). **Resultados**: Algunos términos de la escala se adaptaron culturalmente. La confiabilidad alfa de Cronbach de la escala de 24 ítems fue de 0,88. Los ítems 6, 11, 20 presentaron baja confiabilidad y correlación con la escala (<0,4). El AFE, sugirió solución factorial de cinco factores y un factor por gráfico de sedimentación. Las ecuaciones estructurales de los posibles modelos resultaron con valores de índices de ajuste, cercano a lo satisfactorio. **Conclusiones e Implicaciones para la práctica**: Considerando la combinación de criterios: objetivos; basados en la teoría y en los análisis factoriales, la solución óptima es la de un factor con 21 ítems. La escala presenta ítems adaptados culturalmente. Se propone incorporar ítems más específicos de autocuidado en adolescentes. Investigaciones que evalúen intervenciones tendientes a mejorar la capacidad de autocuidado en adolescentes podrían utilizar la nueva versión de la escala ASA con mejores propiedades psicométricas.

Palabra-clave: Estudios de validación; Autocuidado; adolescente.

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INTRODUCTION

The self-care agency is the person´s skill to continuously assess its health needs and perform self-care activities aimed at promoting and maintaining its health. The actions of the self-care agency or of behaviors of health promotion develop themselves throughout the life and not only occur when health problems arises.[1] This is evidenced through studies that the self-care agency considers as relevant in the development and maintenance of health behaviors-promoting such as to eat healthily, to maintain an appropriate sleep, be active, as well as with regard to specific diseases, in which it is essential to demonstrate self-management skills.[2,3] These actions of self-care agency lead to a reduction of personal costs and of health systems, since persons get sick less often, or need less health care.[4]

In Chile, the self-care is an important element within public health policies, since it is one of the pillars of the health promotion in general, and, specially, in the adolescent population.[5] The importance resides in that, the latter, go through a stage of the life cycle, in the one that they take place, the consolidation of some behaviors and life styles, that can project themselves throughout their life[6] generating unfavorable outcomes for their health. The measurement of these behaviors cannot be made through the observation because they should be inferred from the users' replies, through a self-report. In that regard, it recognized many instruments that measure the self-care in health, such as the scales namely health promotion[7-9] VISA TEEN[10] and others.[11-13]

However, not all of them are validated in our idiom and culture, and the few that have been validated in this context, as the Fitbook[1,2] scale, is not based on theoretical foundations.

In this respect, the self-care theory comes in handy, given that it allows for the understanding the behavior aiming at maintaining the person's functioning, personal development and well-being in favor of its self-care. One recognizes that the basis of this theory focuses on the measurement, the diagnosis, as well as the care implementation, in any situation related to health, both from sick persons, who are making decisions about their health and the healthy one who wish to maintain or change risk behaviors.[14] One of the instruments that incorporates central elements of Orem's self-care theory, is the Appraisal of Self-care Agency Scale (ASA), which was developed by Evers,[15] in the Netherlands. This scale enables measuring the unidimensional concept, by providing a general and not specific assessment of the self-care agency. The translation from English to Spanish, was conducted in Mexico and was adapted in Colombia.[16,17] Studies with the Cronbach´s alpha scale of 0.74 and of 0.95 respectively. The construct validity showed valid and appropriate psychometric properties for adults.

This scale has been used, in different cultures and idioms, as well as in stages of the life cycle and health conditions.[4,18-21] Despite its generalized use, some authors, have shown that the original version, has a complex factorial structure that can compromise the construct validity of the original instrument.[22,23] It shows low evidence of its use in adolescents. In our country it has been used, only in the adult population, although it presents good reliable results,[24] no evidence of validity and reliability was observed in adolescents. Therefore, in order to provide continuity with psychometric tests of the ASA Scale, it aims to conduct the content validity, reliability analysis and examine the construct validity by means of factorial analysis in Chilean adolescents. The purpose is to obtain a measurement that allow us to assess the self-care skills in this age group, which will be helpful both for the diagnosis and for measuring the effectiveness of health interventions for promoting self-care in the adolescent´s health .

METHOD

Cross-sectional descriptive study, made to a non-probabilistic and for convenience sample. The latter, was because, in the final date of data collection, social mobilizations of teachers have presented, which prevented an election of institutions by lot. The sample size, in accordance with authors,[25] considered a minimum acceptable of 200 for performance of the factorial analysis.[25]

The population was composed of adolescents of both sexes, from 12 to 19 years enrolled in a public educational institution in a commune of Concepción, Chile, during 2016-2017. The procedure of the ASA scale application was through the self-application, before the beginning of a class, with monitoring of one of the investigators. The ethical aspects of this research were secured through the review and approval by the accredited scientific and ethical committee. Subsequently each of the students and their tutors were requested the respective written and informed acquiescence and consent. The confidentiality, privacy and response anonymity were assured and the possibility of withdrawing if requested at any time of the instrument application was granted. Finally, considering the privacy of the investigated theme, it was decided not to reveal the commune, nor the institutions to which the students belonged.

Appraisal of Self-Care Agency Scale (ASA)

The instrument used in this study was the version validated in the Colombian population.[17] This consists of 24 items, with answers Likert-type. The score 1 corresponds to never, 2 to rarely, 3 to almost always and 4 to always, therefore, an overall score (sum of all items) of 96 corresponds to a maximum self-care skill and a score of 24 corresponds to a minimum self-care skill. The scale, besides, establishes range of categories of: high with scores higher than 76; medium with scores equal or higher than 75 and low with scores lower than 69. The scale presents three invested items, which needs to be corrected for the overall score, corresponding to: item 6 " I don't have the strength that I needed to take care of myself as I should"; item 11 "I think about exercising and resting a little during the day, but I failed to do it" and item 20 "Due to carry out my daily activities it is difficult for

me to have found time to take care of myself", in that way the score 1 corresponds to always and 4 to never.

Transcultural adaptation of the ASA Scale

In order to adapt the ASA Scale to the Chilean adolescent population, first a review by 6 experts on health promotion of nursing area, whom assessed the conceptual equivalence and the understanding of the items was carried out. The questions were reviewed and it was verified if those were understandable for the language used in our country, bearing in mind the content that they wanted to measure in its original version. From this analysis, smaller modifications were made in writing the words of the items: 5, 9, 13, 14, 17, 20, so that they were clearer and understandable for the Chilean population.

Subsequently, a pilot test was performed for 20 adolescents of both sexes between ages 12 and 18. Semi-structured interviews were conducted in which we enquired about the level of understanding of every item. Analysis and interpretation yielded a good understanding of the scale, being unnecessary to carry out new modifications to this.

The statistical analysis plan consisted of:

a) Descriptive analysis of socio-demographic variables: frequencies, central tendency measures, dispersion, and the normality was explored (Kolmogorov-Smirnov confidence interval for the mean);

b) Reliability analysis, through the internal consistency, Cronbach´s Alpha, considering optimal reliability between 0.7 and 0.9;[26]

c) Analysis of the items: through the correlation of every item and total of scale, through the Pearson´s interclass correlation coefficient the concordance between items through the interclass correlation coefficient (CCI). Values lower than 0.4 were considered as weak and of little relevance; higher than it until 0.50 as moderate; and above 0.50 as strong correlations.[25]

d) Construct validity: Exploratory Factor Analysis (AFE) and Confirmatory Factor Analysis (AFC) was used. Regarding the AFE, adequacy of the data with the Kaiser-Meyer-Olkin (KMO) test was verified, with minimum value of acceptance higher than 0.5) and Bartlett´s test of sphericity (requiring the test to be significant).[25] In order to estimate the number of factors to retaining, Kaiser´s eigenvalues method higher than 1 (Kaiser´s rule) and the graph of sedimentation was used, followed by extraction method of main components with Varimax rotation, since it is one of the most used. Nevertheless, they followed the new recommendations,[25] with the parallel method. This enabled them to explore a possible structure of grouping of the ASA scale items. A minimum level of 0.30 was established to decide the lack of low factorial load items.[26]

As for the AFC, the models were compared (the one found in the AFE and the unidimensional model from the theory) through structural equations by the method of maximum verisimilitude, using the following indicators of goodness of fit: Chi-square test ($\chi 2$);

chi-square ratio ($\chi 2$/g.l) with acceptance value lower than 2.0; Goodness of Fit Index (GFI) with acceptance value higher than or equal to 0.85; GFI Adjusted for Degrees of Freedom (AGFI) with acceptance value higher or equal to 0.80; Root Mean Square Residual (RMR) with acceptance value less or equal to 0.10, Root Mean Square Error of Approximation (RMSEA) with acceptance value less or equal to 0.05; Bentler's Comparative Fit Index (CFI) with acceptance value higher or equal to 0.90 and Bentler & Bonett's Non-normed Fit Index (NNFI) with acceptance value higher or equal to 0.90.[27] For all the analysis we considered statistical significance of 5%. The statistical software used was SPSS-22 (including AMOS for the AFC) from IBM.

RESULTS

The sample consisted of 199 adolescents with a slight predominance of men (53%) and an average age of 15.7 (Standard deviation 1.6; Min 12 and Max. 19). The overall score of ASA scale showed a normal distribution (p= 0.2 Kolmogorov-Smirnov) with an average of 67.1 (DS 12.0; IC95% from 65.8 to 68.7). The items have not diverged from normality, as only one item showed asymmetry higher than 1 (item 8 with asymmetry -1.4), and two items showed kurtosis higher than 1.1 (item 3 with 1.3; item 8 with value 1.4). Men had better average score (68.7) than women (65.1). Likewise, adolescents in the average age category (between 14 and 16 years old) had better average scores (X=69.8), than adolescents in the early and late categories. The overall average value was presented into the low capacity category of self-care. The results by category, showed that 55.8% had low, 19.6% mean and 24.6% high capacity of self-care respectively.

The reliability of the original scale has shown an optimal internal consistency Alpha Cronbach's of 0.88. The item-total correlations show 19 items with correlations above 0.4. The other five items (15, 8, 6, 11 and 20) reflect weak scores and low correlation with the total of scale.

The correlation between item shows that the items 6, 11 and 20 resulted from little relevance (< 0.4), and not significant (p>0.05) with the majority of other items. They also are the only items that have some negative correlations among items.

For validating the construct: first, an exploratory factorial analysis (AFE) was conducted for studying the dimensionality. The Kaiser-Meyer-Olkin test was 0.905 and the sphericity test was significant (p<0.0001). The results showed good adequacy of the matrix, which allowed an accurate factor analysis.

The Kaiser´s rule provided a factor structure with five factors that explained the 56.4% of the total variance. The eigenvalues higher than 1, have shown an evident difference, between the highest eigenvalue (8.00) and the remaining four eigenvalues (1.789, 1.363, 1.238, 1.155).

With the previous results, we carried out the graph of sedimentation (Figure 1). The cutoff point between the first eigenvalue and the others has been noted in this graph. Hence, it was considered that almost one factor is able to explain around

33% of the variance and that the inclusion of the other eigenvalues only explains the remaining variance difference.

Subsequently we proceeded to the confirmatory factor analysis (AFC), where the model was compared with a factor suggested in the analysis of the graph of sedimentation, as well as in the theory and model of five factors as suggested by the Kaiser´s rule. We also included a factor analysis that excluded items that resulted in low contribution (6, 11, 20).

The AFC with the scale of 24 items, showed that the items 6, 11 and 20 had low factor load (<0.3) and the two last negative load. The AFC of the forced solution of 5 factors, (Figure 2) observed that the three first factors, concentrated the items with the greatest factor loads. On the other hand, these had the highest correlation between them (0.7 to 0.8), which would explain a substantial part of the items that form the scale. These factors load only 3 and 2 items respectively, observing low factor loads under 0.3 and negative correlations with the other factors. This means that, although they explain part of the common variance, this is very small, and by the other hand, it is not enough to be interpretable in substantial theoretical terms.

The items 6, 11 and 20 have shown low reliability, correlation and low factor load according to different objective criteria, therefore, it proceeds to carry out the AFC excluding these items.

Figure 1. Graph of sedimentation ASA scale in a sample of adolescents from a commune of the county of Concepción, 2017 (n=199).
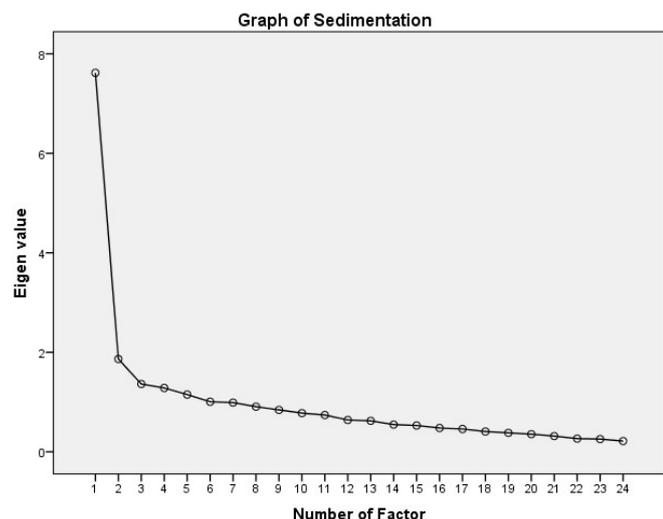
The confirmatory factor solution of 21 items, has evidenced factor loads over 0.3 in all items. The Cronbach´s Alpha reliability of the 21 item-scale improves to 0.91.

Table 1 shows the contrast of the factorial solutions of the three models through the structural equations. The model of 5 factors shows the best adjustment. However, the combined interpretation of objective criteria, as well as the theory, it is recommended that the model which brings together the greatest evidence of parsimonious adjustment is that of a factor with 21 items (that has excluded the items 6, 11 and 20), given that it is the one that presents through a common factor, the explanation of the most substantial part of the items that form the scale.

Figure 2. Path Diagram of the results from the confirmatory analysis of the rotation with five factors (24 items).
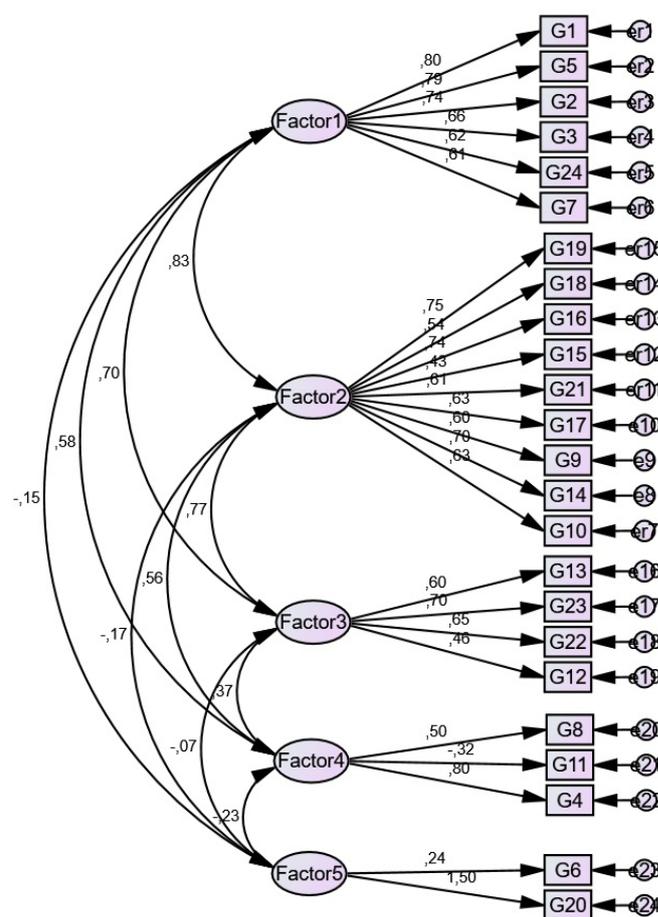

Table 1. Comparative analysis of the three factorial models.

Model	p*	χ²/gl	GFI	AGFI	CFI	RMR	RMSEA (IC 90%)
1 factor (24 items)	<0.0001	2.12	0.81	0.77	0.82	0.06	0.07 (0.06-0.08)
1 factor (21 items)	<0.0001	2.07	0.84	0.8	0.87	0.05	0.07 (0.06-0.08)
5 factors (24 items)	<0.0001	1.54	0.87	0.84	0.92	0.05	0.05 (0.04-0.06)

*Chi-square test

DISCUSSION

This study aimed at adapting and reviewing the psychometric properties of the ASA scale, in a Chilean adolescent population. The findings showed that the scale, from its content presents relevant validity of self-care general aspects in adolescents. The analysis for each item, as well as the scores obtained, describe the self-care general characteristic that has been based on Dorothea Orem's Self-care Deficit Theory,[1] which emphasizes the individual's responsibility in self-care behaviors, and assesses the person´s awareness on health needs and self-care promotion.[17]

More than half of the adolescents of this sample presented low self-care capacity. However, the scale did not describe the specific behaviors that might compromise their health self-care. It is recognized by national studies that an important percentage of adolescents presents problems due to physical inactivity, obesity, unhealthy eating, consumption of alcohol, tobacco, drugs, among others.[28] For this reason, there is a need for the scale be complemented with specific aspects or self-care problems for this age group.

With regard to the reliability of the ASA scale of the original version it showed an Alpha Cronbach´s optimal level of reliability, in addition it was higher compared to other studies, although in different age groups and health condition, which ranged between 0.65 to 0.86.[4,16,18] On the other hand, there is little homogeneity in some items specially, those that were constructed conversely, resulting in low correlations with the scale, and negative with most other items. The overall reliability of the scale improves if these items are eliminated. Similar results have been coinciding with other studies, such as the one conducted on a population in Costa Rica,[20] which also presents low correlation in the items 6, 7, 8, 11 and 20; the one of Colombia,[17] and that they have even proposed new ASA scale versions, generating smaller and even more, multidimensional scales.[2,3,22,23,29]

In this study, the construct-related validation through a confirmatory and exploratory factorial analysis was explored. The analysis of the first produced a factorial solution of five factors, where an unclear and complex dimensional structure was observed, as it was not possible to recognize items that were conceptually related. This factorial solution differed, in addition, with the unidimensionality postulated originally from the theory.[30]

On the other hand, the *screeplot* analysis, demonstrated mainly, a factorial solution of a factor, representative for all items. Different studies, produced factorial solutions that differ from one another, such as the one of Costa Rica,[20] which showed five factors, however, demonstrated such as in this study, that several items present inappropriate loads in some factors. The same is observed in a study conducted in Colombia,[17] which produces a factorial solution of nine factors and that, due to the poor adjustment to the instrument, it is decided to eliminate 5 items (4, 6, 11, 12, 20), suggesting a scale with 18 items, and only two factors, without mentioning a theoretical foundation. Another study, carried out in diabetics,[31] initially found a solution of seven factors and that after carrying out the *screeplot* diagram test, they found that only two factors were representative of the data set

and after forcing the factorial solution four items were excluded. From this version, it derived a validated scale for the Brazilian population, which excluded 14 items, remaining grounded in the theory in three factors.[22]

The successive psychometric tests of this last version of the ASA, carried out in different cultures,[2,23,29] have achieved a good adjustment. However, its use has shown so far only in a population with some chronic condition and in the elderly. Its use from this last reduced version in the adolescent population is unknown.

On the other hand, the construct validity assessed through the confirmatory factorial analysis, suggests an adjustment closest to satisfactory in the different factorial solutions of five and of one factor (with and without excluded items). Therefore, the results do not suggest a defined structure of the original ASA scale. However, considering the combination of objective criteria, those one based on the theory, and in the interpretability of the factorial solutions, the more plausible and parsimonious optimal solution is the one of a factor with 21 items. The items that resulted with low contribution in the different objective analysis were those drafted inversely.

On the basis of the above, one suggests removing the invested items or re-construct items in only one sense. This would be substantiated, since the psychometry[32] that guides that even though to safeguard the sincerity of answers of a scale, it is recommended items invested in number equivalent to those of positive sense. The ASA scale, only has three items in invested sense, this maybe, is the bias, that obstructs the acquiescence of answers and maybe, clearer results of construct validity.

Health professionals need to favor the health care skill in the persons especially in adolescents, given that this is a transcendental stage that will impact on their health. The Self-Care Theory, guides how to detect these deficits; the psychometric investigation, can contribute to improve the instruments measurements of these skills. This research contributes to generate evidence, when proposing a new version of the ASA scale for the adolescent population and suggests the incorporation of specific aspects of this age group.

CONCLUSIONS AND IMPLICACIONS FOR PRACTICE

The ASA scale presents a cultural adaptation for Chilean adolescents, although it requires complementing the self-care behaviors inherent in this age group. The sample showed low self-care capacity, but the scale does not show, that specific behaviors are those who are in deficit of self-care. In addition, it is observed a good overall reliability, but, the analysis by items, shows that the invested items, present low contribution to the scale. The scale reliability, improves if these items, are eliminated. The exploratory and confirmatory factorial analysis produced different factorial solutions. The combination of objective criteria since the theory suggests a unidimensional scale, which excludes invested items.

The limitations of this study are related to the sample size although it was close to the one acceptable for the factorial analyses. The convenience and non-probabilistic sample, also exposes the study to the non-representativeness of the adolescent population and to the restriction of generalization of the results.

The type of instrument used can lead to biases related to social desirability. It is suggested that new studies are conducted to complement validation aspects, in order to expand its use as a tool of public health.

AUTHORS' CONTRIBUTIONS

Study conception and design. Data collection. Data analysis and interpretation. Writing and critical review. Approval of the final article version. Responsibility for all aspects of the study, accuracy and integrity of any part of the article: Maritza Espinoza-Venegas. Julia Huaiquián-Silva. Olivia Sanhueza-Alvarado. Milady Valderrama-Alarcón. Néstor Ortiz-Rebolledo

Statistical analysis and data interpretation. Writing and critical review. Approval of the final article version: Responsibility for all aspects of the study, accuracy and integrity of any part of the article: Luis Luengo-Machuca

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