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**Cross-cultural adaptation and psychometric properties of the Iowa-Netherlands
Comparison Orientation Measure for the Brazilian context**

Adaptation of the INCOM scale for Brazil

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Abstract

Introduction: The Iowa-Netherlands Comparison Orientation Measure (INCOM) was developed to measure individual differences in social comparison orientation and has been widely used in research and different contexts. The aim of this study was to adapt the online version of the INCOM and to evaluate its psychometric parameters when applied to a Brazilian population of university students.

Methods: The procedures were divided into two steps: step 1 – cross-cultural adaptation and content validity, and step 2 – assessment of psychometric characteristics. In step 1, the processes of translation, evaluation by expert committee, evaluation by the target population, and the back-translation, were performed. In step 2, 1065 university students participated and factor analysis, analysis of reliability and validity based on external measures were performed.

Results: The adaptation process showed satisfactory results, such as good indicators of content validity. Exploratory factor analysis indicated a two-dimensional structure and adequate factor loadings, except for item 11, which was excluded from the final version. Also, the final version of the scale presented adequate fit indices ($\chi^2 = 148.45$, $df = 26$; $p < 0.001$; $RMSEA = 0.06$; $CFI = 0.99$; $TLI = 0.98$). Evidence of reliability (Cronbach's $\alpha = 0.83$) was found, in addition to positive correlations with negative affect ($r = 0.36$) and negative correlations with positive affect and self-esteem ($r = -0.15$; $r = -0.41$, respectively).

Conclusion: The Brazilian version of the INCOM presents satisfactory psychometric parameters and can thus be used to measure social comparison orientation.

Keywords: INCOM, cross-cultural adaptation, validity, reliability, factor analysis.

Introduction

According to Festinger's theory of social comparison processes¹, all subjects have an impulse to evaluate their abilities and opinions in comparison to others. Especially as objective and non-social means are not available. Although all subjects engage in social comparisons, the extent to which they do so may vary from one individual to another.²⁻⁴

To measure these individual differences, Gibbons & Buunk⁵ constructed the Iowa-Netherlands Comparison Orientation Measure (INCOM), which assesses social comparison orientation, according to Festinger's theory¹. The INCOM was simultaneously developed for the American and Dutch populations, being composed of 11 items divided between the abilities and the opinions factors.

The original scale presents satisfactory psychometric parameters, with good fit indices ($\chi^2 = 520.2$, $df = 1$; $p < 0.001$), adequacy index (GFI) and adjusted adequacy index (AGFI), both > 0.95 for the two factors⁵. It also gathers evidence of convergent validity, based on moderate and strong correlations with competing measures, such as the Attention to Social Comparison Information (ATSCI)⁶ scale (Dutch samples: $r = 0.66$

and American samples: $r = 0.47$), in addition to satisfactorily predicting the behavior of social comparison from four experimental studies⁵.

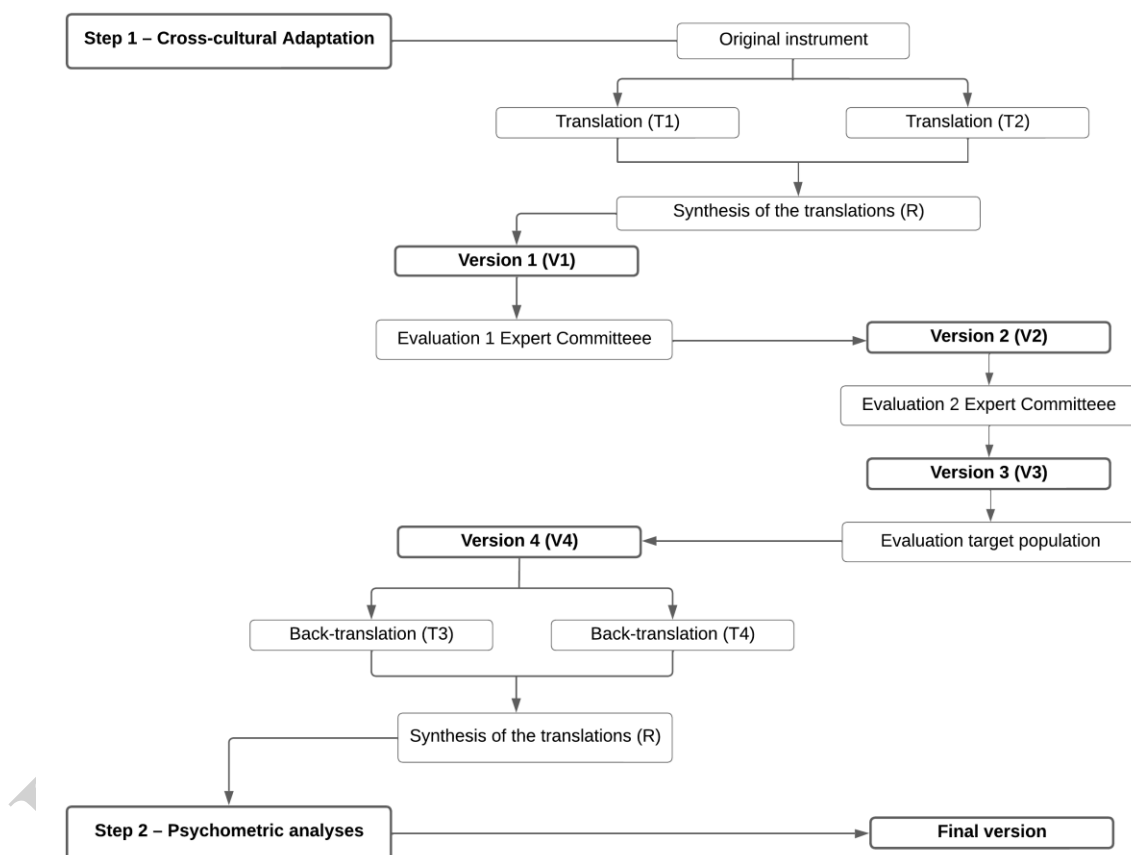
Gibbons & Buunk⁵ also found significant correlations between social comparison and negative affectivity, with higher negative affect scores (Positive and Negative Affect Schedule – PANAS⁷: $r = 0.39$, Dutch samples, and $r = 0.29$, American samples), lower self-esteem, (Rosenberg self-esteem scale⁸: $r = -0.32$, Dutch samples, and $r = -0.18$, American samples), and greater neuroticism (Netherlands Personality Questionnaire⁹: $r = 0.37$, Dutch samples, and $r = 0.33$, American samples). The scale shows evidence of reliability, with a 0.8 Cronbach's alpha in the original sample and temporal stability of 0.60 for application after one year in the United States, and of 0.72 after 7.5 months in the Dutch sample⁵. It is noteworthy that the INCOM did not present significant correlations with measures of social desirability^{10,5}, an especially important characteristic since social comparisons can be considered inadequate and associated with non-valued characteristics, such as helplessness and lack of autonomy^{5,11}.

The INCOM has been widely adapted to other countries, such as Germany¹¹, Russia¹², Portugal¹³⁻¹⁴, Spain¹⁵⁻¹⁶ and Chile¹⁶, with equally satisfactory psychometric parameters. Furthermore, its field of application seems to be extensive and complex, since social comparison has been associated with different dimensions of work¹⁷, well-being¹⁸, depression and anxiety¹⁹, use of social networking sites²⁰ and body satisfaction²¹, for example.

Given the wide use of the INCOM and its adequate psychometric parameters, the need for its adaptation to the Brazilian scenario is evident; enabling the measurement of social comparison in this population. Thus, the aim of this study was to adapt the online version of the INCOM and to evaluate its psychometric parameters when applied to a Brazilian population of university students.

Methods

This study was carried out based on the method of cross-cultural adaptation of instruments proposed by the International Test Commission²²; Borsa et al.²³ and Pasquali²⁴ and it was approved by the Research Ethics Committee with the following protocols: CAAE - step 1: 47946621.3.0000.5339; CAAE - step 2: 47931821.2.0000.5339. The performed procedures were divided into two steps: step 1 – cross-cultural adaptation and content validity, and step 2 – assessment of psychometric characteristics **through a cross-sectional study**. Figure 1 presents the two different steps and their methodological approaches.



All data collection was carried out online, following the guidelines of Circular Letter number 2 of February 24, 2021, of the National Research Ethics Committee, on research procedures in a virtual environment²⁵. All participants (steps 1 and 2) agreed to a Informed Consent Statement.

Step 1 – Cross-cultural adaptation and content validity

This step aimed to perform the translation and cross-cultural adaptation of the scale, as well as to measure the content validity and the validity based on the response process. Prior to the translation process, the authors of the scale were contacted and authorized its adaptation for the Brazilian context. Therefore, the original scale was sent to two independent translators (T1 and T2), one with knowledge about the construct and the other a sworn translator. Both were fluent in Portuguese and had a high level of fluency in English. With the two versions translated, the researchers (R) (GWV and LDMS) performed the synthesis of the versions, evaluating their semantic, idiomatic, conceptual, linguistic and contextual discrepancies²³, arriving at a single version (V1).

V1 was forwarded to the expert committee, formed by four psychologists with technical knowledge in psychometry and/or in the evaluated construct. After the first evaluation by the committee, new adjustments were made to the scale resulting in version 2 (V2). This version was resubmitted for expert evaluation and again underwent minor adjustments (V3). To measure the content validity, the expert committee evaluated the scale from 5 Likert-type questions from 1 to 5, referring to language clarity and its theoretical dimension. With these results, it was possible to calculate the content validity coefficient²⁶ (CVC). The evaluation also included a descriptive assessment of the scale, with a space for suggestions and modifications which were qualitatively evaluated by the researchers (GWV and LDMS).

With V3, the step of evaluation by the target population began, in which eleven university students participated, being 64% (7 participants) of women with an average age of 22.1 years. Participants answered and evaluated the INCOM online through 4 questions regarding clarity, adequacy and understanding of the scale; measured from a Likert scale ranging from 1 to 5 points. From these results, the CVC was calculated, also for the target population²⁶. To measure the validity based on the response process of the scale²⁷, two synchronous remote focus groups were carried out, with 4 and 5 university students, in order to verify the way how the participants responded to the scale and its involved processes, in addition to allowing greater detailing of the suggested indications.

After adjustments, the fourth version of the scale (V4) was completed and sent for back-translation. This process was performed by two different translators from the first translation (T3 and T4), one being a bilingual psychologist and the other a professional specialist in translations process. Again, the researchers (GWV and LDMS) performed

the synthesis of the back-translations and forwarded this version to the authors of the scale, who approved it without suggesting further changes.

Step 2 – Assessment of psychometric characteristics

This step aimed to gather evidence of validity based on the internal structure, reliability and validity based on the relationship with external measures. For the sample calculation, literature recommendations for the process of cross-cultural adaptation of mental health instruments were considered²⁴, which indicate an approximate size of ten subjects per item or 100 per factor/ instrument dimension. Admitting the two dimensions of the scale, the indicated sample number would be of 200 subjects. However, this step is part of a larger study called “Does the use of Instagram, mediated by social comparison and self-esteem, impact the affect of Brazilian university students?”, which aims to verify longitudinally the relationships between social comparison, self-esteem, positive and negative affects and the intensity and profile of the use of the social network Instagram by university students in Brazil. Sample calculation indicated a sample of 940 subjects, with 1065 participants being included at the end. It is worth mentioning that the increase in the sample does not harm the objective of the study, since, for the verification of psychometric parameters, it is indicated that the samples are large enough to allow the availability of statistical information²².

A total of 1065 Brazilian university students from all regions of the country participated in this stage. Most of them were women (68.8%), white-colored (56.1%), aged between 18 and 64 years ($M=23.4$, $SD= 6.1$), enrolled in courses from the human sciences (29.7%) and did not report the presence of a psychiatric diagnosis at the time (79.2%). Only undergraduate students were included. The sample selection took place through the non-probabilistic method, however, we sought to recruit participants in a stratified manner according to the region of Brazil in which they resided (south, southeast, midwest, northeast and north). Thus, the participants were 41% from the Southeast, 20.2% from the South, 20% from the Northeast, 10.2% from the Midwest and 8.5% from the North, in similar proportions to the relative distribution frequency of university students in the country, based on data provided by the Ministry of Education²⁸ (MEC).

Sample capture was carried out via the internet, and the invitation with the access link to the questionnaire was sent from different platforms, such as email, Instagram and WhatsApp.

Instruments

General questionnaire

a structured questionnaire containing variables regarding sex, age, state of residence, institution, course and presence of psychiatric diagnosis (self-report) at the time.

Iowa-Netherlands Comparison Orientation Measure⁵ (INCOM)

a scale developed to measure individual differences in comparative orientation, that is, an individual's inclination to collect information about other people and/or to compare information for their own assessment. The INCOM comprises 11 items divided between two factors. The first one concerns the comparison of abilities and includes 6 items related to performance, which indicate "how skilled am I compared to others?". The second factor, referring to opinions, comprehends the 5 remaining items, associated with "what should I think?" or "how should I feel?" based on the comparison with others. The answers vary on a Likert scale from (1) I disagree strongly to (5) I agree strongly, with questions 5 and 11 being scored in reverse. Higher scores indicate that the subject is more likely to collect information about other people and/or to apply that information to their own situations. At this stage, the version of the scale already semantically adapted to the Brazilian context was applied, maintaining the 11 items (V4).

Positive and Negative Affect Schedule⁷ (PANAS)

a self-report instrument that contains two subscales with a total of 20 items designed to measure positive and negative affect. These are conceptualized as distinct dimensions of emotional experience, being positive affect related to experiencing positive mood, with feelings such as interest, and enthusiasm. Meanwhile, negative affect is associated with emotions such as nervous, afraid and guilty. It is a Likert-type scale, with responses ranging from (1) very slightly or not at all, to (5) extremely, identifying how much the respondent has experienced a certain emotion in the last few days. The scale provides two independent scores, one for positive affect and one for negative affect.

The PANAS is one of the mostly used instruments to measure affects, being adapted and validated with good psychometric results for several countries²⁹⁻³⁶, as well as for Brazil³³⁻³⁵. The results of the most recent study indicate that the PANAS has

satisfactory psychometric properties, with Cronbach's $\alpha = 0.84$ for the positive affect scale and 0.90 for the negative affect scale³⁵. In the study, positive and negative affect scores were used to measure negative and positive convergent validity, respectively, with the INCOM scale. In the current sample, the scale maintained satisfactory reliability parameters with Cronbach's $\alpha = 0.92$ and 0.91 for the subscales of positive and negative affect, respectively.

Rosenberg Self-Esteem Scale^{8,37} (RSES)

This is a one-dimensional measure that globally assesses self-esteem from 10 statements based on a set of feelings related to self-esteem and self-acceptance. Responses are determined by a Likert scale ranging from (0) strongly disagree to (4) strongly agree, so the higher the score the greater the self-esteem.

This has been one of the mostly used instruments in the assessment of self-esteem, being translated into 28 languages and distributed in more than 53 countries³⁸. In Brazil, this instrument was originally adapted and validated for research by Hutz³⁹ and revalidated by Hutz & Zanon³⁷, with satisfactory psychometric properties, presenting Cronbach's $\alpha = 0.90$. In the study, self-esteem scores were used to measure negative convergent validity with the INCOM scale. The RSES maintained satisfactory reliability parameters for the current sample, with Cronbach's $\alpha = 0.90$.

Statistical Analyses

The data obtained in step 1 were analyzed using the Microsoft Office Excel software. The cut-off point for the CVC was ≥ 0.80 both for each of the items and for the general instrument.²⁴

In step 2, the statistical programs FACTOR software, and Statistical Package for Social Sciences (SPSS 22.0) were used. An Exploratory Factor Analysis was performed aiming to evaluate the factor structure of the INCOM. The analysis was implemented using a polychoric matrix and the Robust Diagonally Weighted Least Squares⁴⁰ (RDWLS) extraction method. The decision on the number of factors to be retained was performed using the Parallel Analysis technique with random permutation of the observed data⁴¹ and the Robust Promin rotation method.⁴²

The unidimensionality of the scale was investigated using the Unidimensional Congruence (UniCo), the Explained Common Variance (ECV) and the Mean of Item

Residual Absolute Loadings (MIREAL) indicators. Values of $\text{UniCo} < 0.95$, $\text{ECV} < 0.85$ and $\text{MIREAL} > 0.30$ indicate that the scale's unidimensionality is not supported.⁴³

The adequacy of the model was evaluated using the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) fit indices. According to literature⁴⁴, RMSEA values should be < 0.08 , with a confidence interval not reaching 0.10, whereas the CFI and TLI values must be > 0.90 or preferably 0.95.

The stability of the factors was assessed using the H index. The H index assesses how well a set of items represents a common factor. H values range from 0 to 1. H values > 0.80 suggest a well-defined latent variable, which is more likely to be stable across different studies. Low values of H suggest an ill-defined latent variable, and probably unstable amongst different studies.⁴³

Moreover, the Factor Determinacy Index (FDI), the Overall Reliability of fully-Informative prior oblique N-EAP scores (ORION), the Sensitivity ratio (SR) and the Expected percentage of true differences (EPTD) were considered. These indices assess the quality and accuracy of factor score estimates, pointing to scale adjustments for both research applications and individual clinical assessments. For this, the values recommended are as follows: $\text{FDI} > 0.90$, $\text{ORION} > 0.80$, $\text{SR} > 2$ and $\text{EPTDs} > 90\%$.⁴³

The scale's reliability indices were also evaluated using composite reliability and Cronbach's alpha, with values > 0.70 ⁴⁵ being considered adequate. For the validity based on the relationships with external measures, the association between the INCOM score and the positive and negative affect (PANAS) and self-esteem (RSES) was calculated from the Spearman correlation test⁴⁶, due to the non-parametric distribution of continuous variables, being correlations with $p < 0.05$ considered statistically significant.

Results

Step 1 – Cross-cultural adaptation and content validity

Table 1 presents the versions of the INCOM scale throughout the cross-cultural adaptation, starting with the original scale, followed by the synthesis of the translations (V1), the adjustments after the first and second evaluation by the expert committee (V2, V3), the changes which were discussed with the target population (V4), the back-translation and the final version.

Table 1 – Comparison between the original Iowa-Netherlands Comparison Orientation Measure (INCOM) scale and the different versions throughout the cross-cultural adaptation.

Original version	Version 1	Version 2	Version 3	Version 4	Back-translated version	Final version
1. I often compare how my loved ones (boy or girlfriend, family members, etc.) are doing with how others are doing.	Comparo como as pessoas que amo (namorado(a), familiares, etc.) estão em relação a como outras pessoas estão.	* Eu frequentemente comparo como as pessoas que amo (namorado(a), familiares etc.) estão em relação a como outras pessoas estão.	*Eu frequentemente comparo como estão as pessoas que amo (namorado(a), familiares etc.) com como outras pessoas estão.	*Eu frequentemente comparo como estão as pessoas que amo (namorado(a), familiares etc.) com como estão outras pessoas.	I often compare the people I love (partner, family, etc.) to other people.	Eu frequentemente comparo como estão as pessoas que amo (namorado(a), familiares etc.) com como estão outras pessoas.
2. I always pay a lot of attention to how I do things compared with how others do things.	Presto muita atenção em como faço as coisas comparado à como os outros fazem as coisas.	*Eu sempre presto muita atenção em como faço as coisas comparado à como os outros fazem as coisas.	*Eu sempre presto muita atenção em como faço as coisas, comparado ao modo como os outros fazem as coisas.	Eu sempre presto muita atenção em como faço as coisas, comparado ao modo como os outros fazem as coisas.	I always pay a lot of attention to how I do things, comparing to how other people do things.	Eu sempre presto muita atenção em como faço as coisas, comparado ao modo como os outros fazem as coisas.
3. If I want to find out how well I have done something, I compare what I have done with how others have done.	Se quero saber o quão bem fiz algo, comparo o que eu fiz em relação a como os outros fizeram	Se quero saber o quão bem fiz algo, comparo o que eu fiz em relação a como os outros fizeram.	*Se quero saber o quão bem fiz algo, comparo o que eu fiz a como os outros fizeram.	Se quero saber o quão bem fiz algo, comparo o que eu fiz a como os outros fizeram.	If I want to know how well I have done something, I compare what I have done to how others have done it.	Se quero saber o quão bem fiz algo, comparo o que eu fiz a como os outros fizeram.

*Items altered after evaluation, specifically the words in bold.

Table 1 – Comparison between the original Iowa-Netherlands Comparison Orientation Measure (INCOM) scale and the different versions throughout the cross-cultural adaptation (continuation).

Original version	Version 1	Version 2	Version 3	Version 4	Back-translated version	Final version
4. I often compare how I am doing socially (e.g., social skills, popularity) with other people.	Comparo como estou me saindo socialmente (por exemplo, habilidades sociais, popularidade) com outras pessoas.	*Eu frequentemente comparo como estou me saindo socialmente (por exemplo, manifestar opinião, iniciar e manter conversas , popularidade) com outras pessoas.	Eu frequentemente comparo como estou me saindo socialmente (por exemplo, manifestar opinião, iniciar e manter conversas, popularidade) com como outras pessoas estão.	*Eu frequentemente comparo minha vida social (por exemplo, manifestar opinião, iniciar e manter conversas, popularidade) com a dos outro .	I often compare my social life (e.g., expressing my opinion, starting and maintaining conversations, popularity) with that of others.	Eu frequentemente comparo minha vida social (por exemplo, manifestar opinião, iniciar e manter conversas, popularidade) com a dos outro.
5. I am not the type of person who compares often with others. (reversed)	Não sou o tipo de pessoa que costuma se comparar com outros.	*Não sou o tipo de pessoa que costuma se comparar frequentemente com os outros.	Não sou o tipo de pessoa que costuma se comparar frequentemente com os outros.	Não sou o tipo de pessoa que costuma se comparar frequentemente com os outros.	I am not the type of person who often compares myself with others.	Não sou o tipo de pessoa que costuma se comparar frequentemente com os outros.
6. I often compare myself with others with respect to what I have accomplished in life.	Me comparo com outros no que diz respeito ao que realizei na vida.	*Frequentemente me comparo com outras pessoas no que diz respeito ao que realizei na vida.	Frequentemente me comparo com outras pessoas no que diz respeito ao que realizei na vida.	*Frequentemente me comparo com os outros no que diz respeito as minhas conquistas pessoais .	I often compare myself with others in what concerns my achievements.	Frequentemente me comparo com os outros no que diz respeito as minhas conquistas pessoais.

*Items altered after evaluation, specifically the words in bold.

Table 1 – Comparison between the original Iowa-Netherlands Comparison Orientation Measure (INCOM) scale and the different versions throughout the cross-cultural adaptation (continuation).

Original version	Version 1	Version 2	Version 3	Version 4	Back-translated version	Final version
7. I often like to talk with others about mutual opinions and experiences.	Gosto de conversar sobre opiniões e experiências mútuas.	*Eu frequentemente gosto de conversar com outras pessoas sobre opiniões e experiências em comum.	Eu frequentemente gosto de conversar com outras pessoas sobre opiniões e experiências em comum.	Eu frequentemente gosto de conversar com outras pessoas sobre opiniões e experiências em comum.	I often like to talk to other people about common opinions and experiences.	Eu frequentemente gosto de conversar com outras pessoas sobre opiniões e experiências em comum.
8. I often try to find out what others think who face similar problems as I face.	Tento descobrir o que pessoas que enfrentam problemas parecidos com os meus pensam.	*Eu frequentemente tento descobrir o que pensam as pessoas que enfrentam problemas parecidos com os meus.	Eu frequentemente tento descobrir o que pensam as pessoas que enfrentam problemas parecidos com os meus.	*Eu frequentemente tento descobrir o que as pessoas com problemas parecidos com os meus pensam.	I often try to find out what people with problems similar to mine think.	Eu frequentemente tento descobrir o que as pessoas com problemas parecidos com os meus pensam.
9. I always like to know what others in a similar situation would do.	Gosto de saber o que outras pessoas fariam em uma situação parecida a minha.	*Sempre gosto de saber o que outras pessoas fariam em uma situação parecida com a minha.	Sempre gosto de saber o que outras pessoas fariam em uma situação parecida com a minha.	*Sempre gosto de saber o que outra(s) pessoa(s) faria(m) em uma situação parecida com a minha.	I always like to know what other people would do in a situation similar to mine.	Sempre gosto de saber o que outra(s) pessoa(s) faria(m) em uma situação parecida com a minha.

Table 1 – Comparison between the original Iowa-Netherlands Comparison Orientation Measure (INCOM) scale and the different versions throughout the cross-cultural adaptation (continuation).

Original version	Version 1	Version 2	Version 3	Version 4	Back-translated version	Final version
10. If I want to learn more about something, I try to find out what others think about it.	Se eu quero aprender mais sobre algo, tento descobrir o que os outros pensam sobre o assunto.	Se eu quero aprender mais sobre algo, tento descobrir o que os outros pensam sobre o assunto.	Se eu quero aprender mais sobre algo, tento descobrir o que os outros pensam sobre o assunto.	Se eu quero aprender mais sobre algo, tento descobrir o que os outros pensam sobre o assunto.	If I want to learn more about something, I try to find out what others think about it.	Se eu quero aprender mais sobre algo, tento descobrir o que os outros pensam sobre o assunto.
11. I never consider my situation in life relative to that of other people. (reversed)	Nunca levo em consideração a minha situação de vida em relação à de outras pessoas.	Nunca levo em consideração a minha situação de vida em relação à de outras pessoas.	Nunca levo em consideração a minha situação de vida em relação à de outras pessoas.	Nunca levo em consideração a minha situação de vida em relação à de outras pessoas.	I never consider my life situation in relation to other people.	Item excluded after psychometric analyses.

*Items altered after evaluation, specifically the words in bold.

After the synthesis of the translations, the experts' evaluation indicated the need for language adjustments, especially the insertion of adverbs of time and manner ("always", "often"), in addition to small changes in the sentence structure. After the adjustments, a new evaluation was requested by the committee resulting in a satisfactory CVC equal to 0.86 for the full scale and > 0.80 for each item.

Version 3, evaluated by the target audience, also presented a satisfactory CVC for all items (> 0.80). During the two focus groups, the participants indicated changes to assist in the understanding of the items, which included changes in terminology (for example, "what I accomplished in life" to "my achievements") and sentence structure, resulting in version 4 of the scale. It was found that the participants had similar and plausible processes to answer the scale. Thus, these indicators gather evidence about content validity and validity based on the response processes of the scale.^{24,26,27}

Step 2 – Assessment of psychometric characteristics

As for the exploratory factor analysis, the sphericity tests of Bartlett (491.4, $df = 55$, $p < 0.001$) and KMO (0.86) suggested interpretability of the correlation matrix of the items. The factor loadings of the items, verified by the exploratory factor analysis, are reported in table 2. The items presented high factor loadings in their respective factors, except for item 11, which showed values lower than 0.30 in both, suggesting its exclusion⁴⁷.

Table 2 – Structure and factor loadings of the Iowa-Netherlands Comparison Orientation Measure (INCOM) items, in its versions with 11 and 10 items, based on the exploratory factor analysis

INCOM - 11			INCOM - 10	
Items	Factor 1 – abilities	Factor 2 – opinions	Factor 1 – abilities	Factor 2 – opinions
1. Eu frequentemente comparo como estão as pessoas que amo (namorado(a), familiares etc.) com como estão outras pessoas.	0.52	0.06	0.52	0.05
2. Eu sempre presto muita atenção em como faço as coisas, comparado ao modo como os outros fazem as coisas	0.73	0.09	0.74	0.08
3. Se quero saber o quão bem fiz algo, comparo o que eu fiz a como os outros fizeram.	0.75	0.13	0.76	0.11
4. Eu frequentemente comparo minha vida social (por exemplo, manifestar opinião, iniciar e manter conversas, popularidade) com a dos outro.	0.82	-0.02	0.82	-0.02

*Item with factor loading < 0.30 for the two factors.

Table 2 – Structure and factor loadings of the Iowa-Netherlands Comparison Orientation Measure (INCOM) items, in its versions with 11 and 10 items, based on the exploratory factor analysis (continuation).

INCOM – 11			INCOM – 10	
Items	Factor 1 – abilities	Factor 2 – opinions	Factor 1 – abilities	Factor 2 – opinions
5. Não sou o tipo de pessoa que costuma se comparar frequentemente com os outros.	-0.78	0.20	-0.78	0.19
6. Frequentemente me comparo com os outros no que diz respeito as minhas conquistas pessoais.	0.77	0.03	0.78	0.03
7. Eu frequentemente gosto de conversar com outras pessoas sobre opiniões e experiências em comum.	-0.21	0.65	-0.21	0.66
8. Eu frequentemente tento descobrir o que as pessoas com problemas parecidos com os meus pensam.	-0.05	0.86	-0.06	0.86

*Item with factor loading < 0.30 for the two factors.

Table 2 – Structure and factor loadings of the Iowa-Netherlands Comparison Orientation Measure (INCOM) items, in its versions with 11 and 10 items, based on the exploratory factor analysis (continuation).

INCOM - 11			INCOM - 10	
Items	Factor 1 – abilities	Factor 2 – opinions	Factor 1 – abilities	Factor 2 – opinions
9. Sempre gosto de saber o que outra(s) pessoa(s) faria(m) em uma situação parecida com a minha.	0.02	0.83	0.02	0.84
10. Se eu quero aprender mais sobre algo, tento descobrir o que os outros pensam sobre o assunto.	0.04	0.60	0.04	0.61
*11. Nunca levo em consideração a minha situação de vida em relação à de outras pessoas.	-0.23	0.06		

*Item with factor loading < 0.30 for the two factors.

Subsequently, the exploratory factor analysis was performed again with the 10-item version of the scale (INCOM-10). In this version, the factor loadings of the items remained high in their respective factors (table 2), with satisfactory fit indices ($\chi^2 = 148.45$, $df = 26$; $p < 0.001$; $RMSEA = 0.06$; $CFI = 0.99$; $TLI = 0.98$).⁴² Thus, the following analyses concern the final version of the scale, with 10 items.

Parallel analysis, described in table 3, indicated that two factors of the real data present a higher percentage of explained variance than the random data, suggesting the retention of the two dimensions of the scale. When considering the 95% confidence interval, factor 2 has a small difference, with a value of real data smaller than the random data. For confirmation purposes, the values of UniCo (< 0.95), ECV (< 0.85) and MIREAL (> 0.30) which did not support the unidimensionality of the scale were considered, thus maintaining the two-factor structure.⁴²

Table 3 – Parallel Analysis and unidimensionality indicators of the Iowa-Netherlands Comparison Orientation Measure (INCOM) 10-item version.

Factors	Percentage of explained variance of real data	Percentage of explained variance of random data	Percentage of explained variance of random data (95% CI)
1	51.62*	20.33	25.80
2	19.50*	17.83	21.91
3	8.07	15.41	18.20
4	6.70	13.21	15.50
5	5.10	11.05	13.20
6	4.30	8.80	11.30
7	2.50	6.61	9.43
8	1.83	4.50	7.25
9	0.45	2.30	4.91
UniCo (95% CI)		0.87 (0.85 - 0.90)	
ECV (95% CI)		0.75 (0.73 - 0.77)	
MIREAL (95% CI)		0.35 (0.33 - 0.36)	

*Number of factors to be retained. CI = 95% confidence interval. UniCo = Unique Unidimensional Congruence. ECV = Explained Common Variance. MIREAL= Mean of Item Residual Absolute Loadings

The replicability measure of the H-index factorial structure presented values > 0.80 for both factors (H-latent: Factor 1 = 0.90; Factor 2 = 0.87; H-observed: Factor 1 = 0.88; Factor 2 = 0.84) suggesting that this structure may be replicable in future studies. Regarding the quality and precision of the factor scores indices, FDI (Factor 1 = 0.95; Factor 2 = 0.93), ORION (Factor 1 = 0.90; Factor 2 = 0.87), SR (Factor 1 = 2.97; Factor 2 = 2.60) and EPTD (Factor 1 = 92.4%; Factor 2 = 91.2%) showed adequate results, indicating the scale is also applicable for individual clinical assessment.

For reliability analyses, composite reliability and Cronbach's alpha were measured with versions of 10 (INCOM-10) and 11 items (INCOM-11) of the scale. The composite reliability was adequate only for the INCOM-10 version (abilities = 0.88; opinions = 0.80), while the INCOM-11 indicated an unsatisfactory value for the second factor (abilities = 0.88; opinions = 0.75). Cronbach's alpha values were also adequate, with a slight increase for the INCOM-10 version (alpha = 0.83) in comparison to the INCOM-11 (alpha = 0.82).

Regarding the validity based on external measures, a significant positive correlation was found between the INCOM and the negative affect subscale, and significant negative correlations were found between the INCOM and the positive affect subscale and the Rosenberg self-esteem scale (Table 4). Despite presenting approximate results, the correlations between the INCOM-10, positive affect, and self-esteem were significantly higher when comparing the correlations between the INCOM-11 and these scales, as indicated by the Fisher r-to-z transformation test (PANAS - positive affect: $z = -5.44$; $p < 0.001$; EAR: $z = -3.44$; $p < 0.00$). Thus, the INCOM-10 has a greater association with external measures in comparison to the INCOM-11.

Table 4 – Correlations between the 10-item and 11-item versions of the Iowa-Netherlands Comparison Orientation Measure (INCOM) and external variables.

Variables	INCOM -10	INCOM -11
PANAS		
Negative affect	.36	.34
Positive affect	-.15	-.15
Rosenberg Self-esteem scale	-.41	-.39

All correlations presented $p < 0.001$. PANAS = Positive and Negative Affect Schedule.

DISCUSSION

This study achieved its objective of adapting the INCOM scale to the Brazilian context and gathering evidence of validity. Step 1 included rigorous and systematic processes of translation, back-translation, evaluation by a committee of experts and by the target audience, in order to guarantee the equivalence of the scale's content.²²⁻²⁴ Satisfactory CVC values together with the qualitative assessments of the processes add significant evidence of content validity, which allowed the verification of other psychometric parameters in the Brazilian context.²⁴

As the original version, our adaptation maintained the two-factor structure with the same division between the items. The authors of the original scale recognize that the unifactorial presentation also show acceptable although less robust adjustment indices.⁵ Moreover, Buunk, et al.,¹⁶ using the Mokken analysis, also found a unique factorial structure for the Spanish version of the INCOM (INCOM -E¹⁵) applied to a new sample in Spain.

In our study, the parallel analysis indicated a small discrepancy in factor 2 when considering the 95% confidence interval, which may indicate greater fragility of the opinions factor in comparison to the abilities factor. However, no unidimensionality indicator was corroborated. In addition, the adjustment indices for two factors presented satisfactory results together with the H-index and the evidence of quality and precision of the factors' scores estimates, indicating the applicability of the scale also to the clinical context.⁴²

Other adaptations carried out for the German¹¹, Portuguese¹³⁻¹⁴, Spanish¹⁵ and the American⁴⁸ populations also found a two-factor structure for the INCOM. In view of this evidence, the final version of the INCOM scale adapted to the Brazilian context maintains two factors; the first reflecting an interest in comparison related to performance or ability (items 1 to 6), while the second indicates an interest in comparison based on opinions (items 7 to 10), in consonance with the discussions initiated by Festinger on the social comparison processes¹.

As for the factor loadings, the items showed satisfactory results, except for item 11, thus indicating its exclusion from the INCOM final version. Other adaptations also found a malfunction of the item. Schneider & Schupp¹¹ excluded the item from the German version of the scale, also due to insufficient factor loading. Chilean and Spanish

versions¹⁶ removed item 11, along with item 5, which is also inverted, due to their factor loadings. Furthermore, the items exclusion favored the scale adjustment indices. The same happens with specific samples, such as the INCOM Portuguese version applied to parents of children with chronic health conditions¹⁴, which also excluded the inverted items (items 5 and 11). In the adaptations in which item 11 was kept^{13,15,48}, it presented a factor loading associated with the abilities dimension, different from what the original scale proposed (belonging to the opinions dimension), suggesting incompatibilities in its structure.

It is worth mentioning that item 11 did not change in terms of sentence structure or terminology during step 1. Thus, the unsatisfactory factor loading would not be associated with divergences and specific difficulties in semantic adaptation. Hypotheses of acquiescence or misunderstanding of inverted items are also not justified, since item 5 had a high factor loading in its corresponding factor. Thus, item 11 does not seem to be representative to assess the proposed content, being excluded from the final version of the scale, **which maintained its satisfactory psychometric properties.**

Regarding reliability of the scores, both the composite reliability⁴⁴ and the Cronbach's alpha presented satisfactory values, very close to the original version of the scale (Cronbach's alpha = 0.83)⁵. Furthermore, the removal of item 11 increased the parameter values, corroborating its exclusion.

The associations with external measures presented expected directions similar to those found in the original scale, with moderate correlations⁴⁶ between the INCOM and negative affectivity, with higher negative affect scores and lower self-esteem scores. When adapting the INCOM-Escale, Buunk et al.¹⁵ also found negative correlations with the Rosenberg self-esteem scale. The prototypical image developed by Gibbons & Buunk⁵, points out that subjects with high social comparison scores present a combination of high accessibility and self-awareness, interest in what others feel and think and some degree of self-uncertainty and negative affectivity. All of these strengthen the convergent validity of the evaluated instrument.

The association with positive affect was negative and weak, similar to the original scale, which showed weak correlations with the same subscale and with other measures of positive outcome, such as optimism and well-being.⁵ The Spanish version also found weak associations with optimism and psychological well-being.¹⁵ Thus, the INCOM

discriminates negative affect more robustly than positive affect. It is noteworthy that two studies found neuroticism as the most associated characteristic with social comparison scores^{5,15}. In the original scale, the commonality analysis indicated that the positive relationships between social comparison and other negative affective traits had been attributable to its relations with neuroticism.⁵

Our study did not include neuroticism in the measurement of negative convergent validity, but we suggest its evaluation in future studies, as well as the investigation of the relationship of social comparison with other personality characteristics in order to broaden the understanding of the construct. Another limitation concerns the non-systematic sampling process, however, in addition to our sample being expressive, it included university students from all regions of the country, contributing to the representativeness of this population. Furthermore, future adaptations in populations with specific characteristics and less educational levels (clinical samples, for example) can also increase the validity of the scale. Nonetheless, the present study demonstrated that the INCOM scale, with a two-factor structure and 10 items presentation, presents satisfactory psychometric parameters that support and justify its applicability in Brazil, being a useful tool to assess social comparison both in research and clinical contexts.

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