Validation of the French translation of the Herth Hope Index assessment (HHI-F)

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Abstract

Objective This article presents the french validation of a hope assessment scale for use in an international study on the mental health of Swiss and Portuguese students during a pandemic (Querido et al., 2021). is The original hope assessment scale is the Herth Hope Index (HHI) (Herth, 1991) which measures different dimensions of hope and assesses the state of motivation to overcome situations with strong stressful or life-threatening components. Methods Our methodology is divided into two main steps. The first step aims at evaluating the qualitative aspects of the assessment tool. We will use a literal translation and a cultural adaptation through cross-cultural validation. We will start with a back-translation method for the translation and preparation of a draft version. Then, we will evaluate the draft by selecting a committee of experts and a sample of "end-users" to correct the initial translation and produce a consensus version. The second part will concern the evaluation of the psychometric and metrological qualities of the instrument. We will set up a method of parallel/equivalent form reliability and tests of convergent/divergent validity with other tools assessing similar constructs. Results We obtained a consensus from our expert panel (n=7) after our back-translation. We then tested the translation on a pilot group of students (n=13) in order to highlight potential comprehension problems. We obtained CVIs >.80 for all of our items in the second test run, which indicates that the translation is understood and accepted by the subjects. We also measured the concurrent validity between the HHI-F (target instrument) and other scales (criterion instruments) measuring the same phenomena, which were administered simultaneously to our subjects (i.e. DASS-21, IES-R and BRCS). The results suggest good translation validity of the HHI-F: systematically negative correlations between the HHI-F and the DASS-21 (r= -.562; p=000); all correlations between the IES-R and the HHI-F are negative (r= -.301; p=000) and all correlations between the HHI-F scale and the BRCS are positive (r= .552; p=000). Discussion The french version of the Herth Hope Index (HHI) is translated. Validation of the qualitative and quantitative criteria was carried out and the results show that the French version (HHI-F) has sufficiently strong fidelity and validity criteria to be used in practice.

1. Introduction

Questionnaires and other self-reporting methods are not just complementary assessment tools for research and clinical use, which are intended to provide additional information for quantitative analyses. Indeed, they are sometimes the only means of recording information, variables, or symptoms such as retrospective events (e.g. levels of exposure to certain risk factors), knowledge (e.g. therapeutic education or prevention strategies), perceptual-sensory evaluations (e.g. perceptions, representations, opinions) or cognitive, psychological and emotional evaluations.

Moreover, questionnaires allowing self-reporting on the last-mentioned measures (i.e. cognitive, psychological, emotional evaluations) are becoming increasingly important in our society where data is constantly increasing and the possibilities of analysis are more powerful. However, it is essential in research or clinical practice to choose measures that reflect the most representative picture of the

variables under study. Therefore, these instrumental measures must be verified and verifiable and have the highest possible metrological and psychometric qualities.

Hope has been recognized in all disciplines as an important and necessary motivational state for overcoming life's adversities or situations of great and imminent danger.

A high level of hope even seems to be a prerequisite for better coping, effective and reflective decision making and seems to decrease associated problems such as stress, depression and related adverse effects.

In his thesis, Moreau (2009, p. 14) gives several definitions of the hope construct. One of them is a consensus and demonstrates the relation between this psychological state and the social, behavioral and cognitive reactions that result from it:

“Hope is a positive anticipation of the future, based on mutuality of relationships with others, a sense of personal competence, coping skills, psychological well-being, meaning in life as well as a sense of possibility; the hopeful person expects to experience positive consequences ».

The relation between hope and the implementation of positive strategies or the improvement of variables related to psychosocial well-being now seems to be well demonstrated in contexts of identified hazards such as wars, conflicts or chronic and/or severe diseases (Chadwick, 2015; Cooper, 2006; Herth, 1990; Leite, 2020; Robieux et al., 2018). These findings are further supported by several qualitative, non-experimental and quasi-experimental studies as well as systematic reviews and meta-analyses (Duggleby et al., 2010, 2012; Hernandez & Overholser, 2021; Koehn & Cutcliffe, 2007; Nayeri et al., 2020). Nevertheless, the beginning of the 21st century is witnessing the emergence of new threats that illustrate the vulnerability of our societies to health, industrial, natural, social or technological risks (e.g. coronavirus pandemic, explosion of an ammonium nitrate depot in Beirut, uncontrollable forest fires in Australia and the Amazon, hurricanes in the United States, tsunamis in Japan and Indonesia, multiplication of social protest movements, etc). Hope could be an important variable to study and use in these circumstances, both as a weighting variable and as an explanatory variable for the emotional states, attitudes and behaviors observed in the population.

The evaluation of the level of hope and the variables that can influence it are therefore essential to assess in a management that involves the occurrence of an event with a strong stressful and dangerous component. In view of the above, it is important (1) to be able to reliably assess levels of hope, (2) to propose strategies for strengthening hope and (3) to evaluate the results of the actions taken.

With this in mind, Herth (1991, 1992) developed an instrument for assessing 'hope': the Herth Hope Index (HHI).

1.1 Presentation/description of the Herth Hope Index (HHI)

The HHI assesses hope through 12 items that measure 3 main dimensions related to:

1. Temporality and the future (items 1, 2, 6 and 11);

2. Preparation (items 4, 7, 10 and 12);

3. Positive expectations and interconnection (items 3, 5, 8 et 9).

The measurement instrument uses a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). The scale has an overall score ranging from 12 to 48. A higher score indicates a higher level of hope.

The HHI has been translated into several languages, including Spanish (Arnau et al., 2010), Swedish (Benzein & Berg, 2003), Chinese (Chan et al., 2012), Italian (Ripamonti et al., 2012), German (Geiser et al., 2015) and Portuguese (Viana et al., 2010), but this list is not exhaustive. Nevertheless, the dimensionality of the HHI has been shown to be rather unstable in translations between cultures and different types of populations (Ripamonti et al., 2012) with factors of greater or lesser importance depending on the culture: religiosity, self-confidence, inner strength, etc. (see Table 1). This is why a cross-cultural validation process is important in order to ensure the validity of the tool when changing from French to English.

Table 1. Summary of Cronbach's alphas and dimensions for the different HHI translations

Author (year), places	Language of the destination	Number of dimensions/ Factors	Alpha de Cronbach
Original Version : Herth (1992), USA	English	3	α = 0.97
Geiser & al. (2015), Germany	Germany	3	α = 0.82
Khater & al. (2013). Jordanie	Arabic	Not calculated	α = 0.61
Mousa & al. (2017). Egypte	Arabic	3	α = 0.78
Chan & al. (2012). Chine	Chinese	3	α = 0.80
Arnau, & al. (2010)	Spanish	4	Describes as satisfactory
Sánchez-Teruel & al. (2020)	Spanish	2	α = 0.97
Van Gestel-Timmermans & al. (2010)	Dutch	2	α = 0.84
Ripamonti, & al. (2012), Italia	Italian	1	α = 0.84
Hirano & al. (2007). Japon	Japanese	3	α = 0,89
Ishimwe & al. (2015). Rwanda	Kinyarwanda	Not calculated	α = 0,85
Wahl & al. (2004). Norway	Norwegian	2	α = 0.81
Soleimani & al. (2019). Iran	Persia	1	α =.856
Yaghoobzadeh & al. (2019). Iran	Persia	2	α = 0.70
Viana & al. (2010). Portugual	Portuguese	1	α = 0,873
Balsanelli & al. (2010). Brazil	Portuguese	3	α = 0.834
Benzein et Berg (2003). Sweden	Swedish	2	α = 0.88
Hsu & al. (2007). Thaïlande	Thai	Not calculated	α = 0.89.
Aslan & al. (2007). Turkey	Turkish	3	α = 0.75

To ensure comparability between the original and the translated version, it is recommended to follow a precise translation procedure, using validation methods that have proven their usefulness and reliability (Maneesriwongul & Dixon, 2004).

The objective of the present study is to test the validity of a French version of the HHI questionnaire, named HHI-F, in order to use it with students confronted with health measures and the coronavirus

pandemic.

1.2. General methodology

Our translation and validation methodology will be divided into three main stages:

- The first stage will consist of a bibliographic research in order to verify that the French validation of this questionnaire has not already been done.
- The second stage will be an evaluation of the qualitative aspects. We will carry out a cross-cultural validation in order to adapt the questionnaire to the French cultural context. We will start by working on a preliminary version by selecting two independent bilingual translators specialised in mental health, who will translate the statements into french and then back into the original language (retro-translation). In order to validate this preliminary version, we will select a committee of experts (with the same inclusion criteria, i.e. bilingual and mental health expert) to refine and correct the preliminary version. These first two iterative stages (i.e. construction of a draft and evaluation of the draft) will be repeated until a consensus is reached between our expert committees (Mokkink et al., 2010). Finally, we will select a panel of subjects (n=13) who will perform pre-tests in order to make the final version clear and understandable for our end-users (Waltz et al., 2005).
- The third stage of our research methodology will concern the evaluation of the psychometric and metrological qualities of the HHI instrument translated into french. The literature identifies important commonalities between hope and other constructs that we will use to compare our results.

Each stage is described in a specific part below.

2. Methodology For Evaluation Of The Qualitative Aspects

2.1. Literature search and validation methods

In order to review the literature concerning the existence of a translation and validation of the Herth Hope Index in French we implemented two research strategies :

1. We contacted Dr. Herth, who is the designer of this scale, to ensure that a french translation was not available. She informed us of the use of a french (Quebec) translation but she did not have the details of the validation process of this version.. However, we were unable to obtain this version.

2. We consulted three different databases:

- CINAHL (Cumulative Index to Nursing and Allied Health Literature): focused on research in health sciences, public health, medicine and nursing;
- Pubmed (US National Library of Medicine National Institute of Health) contains biomedical literature from Medline as well as journals and e-books in the life sciences. It is a database that covers

biomedical, health and nursing fields:

- Google Scholar : which is a more generalist database and despite some biases has the advantage of storing a lot of data, including "grey" literature.

For the Cinahl database, we searched with the descriptors "Clinical Assessment tools" and "Translation" or "validation" and "French" and the keyword "Herth Hope Index". In Pubmed, we searched with the words "Self-Assessment" and "Translations" and the keyword "Herth Hope Index". We also used the Google scholar, with a more broader search concerning all of the themes mentioned above as keywords. These searches were carried out in french and english and we did not find any results concerning the translation and validation of the HHI in french.

2.2. Methodology for the preparation of the preliminary french version of the Herth Hope Index (HHI-F).

The translation of a questionnaire involves two essential steps: a literal translation and an adaptation to the cultural context, life habits and idioms of the target population (Bouletreau & Chouanière, 1999).

The HHI measurement instrument does not have a french validation, but it has a validated german translation (Geiser et al., 2015). The Faculty of Health Sciences in Fribourg is a bilingual institution (i.e. French and German). We therefore chose to use the german version in order to validate this instrument in french.

The objective of this step was to set up a methodology for translating this instrument into french. To do so, we used a cross-cultural validation by a back-translation method (Caron, 1999; Mokkink et al., 2010). This methodology requires two steps: **the preparation of a draft version and the evaluation of this draft version.**

Back-translation involves making a first translation into the desired language (i.e. french in our case), then (re)translating the tool into the original language by a different translator. The difference between the original version and the (re)translated version makes it possible to identify the problematic items, and the operation is repeated until a consensus is reached. This step corresponds to the preparation of the draft version.

2.2.1. Sample: selection of translators

We have bilingual teachers in our school with high competence in the field of mental health. We chose the following inclusion criteria: expertise in mental health and teaching in both languages (french and german).

- We selected two independent translators with an academic background in mental health (n=2): a nurse specialist, in mental health who is also a practitioner trainer and a professor, PhD in medical

sciences, teaching in mental health and psychiatry.

2.2.2. Test taking for the preparation of the draft version.

We conducted this step remotely because of the health requirements in January 2021. After receiving an agreement from our two translators to participate in our research, we sent an email to the first one containing the information about our study, the scale in german and the instruction to translate it into french. Then, once we had obtained this first translation, we sent the same email to the second translator with the only difference that we put the translated scale in french and the instruction to (re)translate it into german. We then presented the versions to both parties in order to discuss the differences and reach a consensus.

In order to check the quality of the items in the final version of the questionnaire, we conducted a double check (i.e. qualitative and quantitative). We sought to obtain from our translators both :

- - a qualitative consensus that they had to judge according to a 3-point likert scale "weak, medium or strong",
- a quantitative consensus through the Copyleaks®[1] software.

We corrected the content until we obtained a satisfactory agreement (strong agreement and < 90% agreement) between our two experts (see Figure 1).

2.3. Results: Analysis of the preparation of the draft

We compared the original and the second german (re)translation. We used the Copyleaks software. This software detects paraphrased content, compares lexical fields and textual similarities with the help of artificial intelligence (AI) based algorithms. The aim was to achieve the highest possible similarity. We set the limit of acceptability < 90% similarity, while a document is considered a duplicate from 70% onwards (Calculating the similarity rate, 2020).

For this questionnaire we obtained 97.8% similarity between the original version and the (re)translation made by our 2 independent translators (see Figure 2).

Following the similarity analysis, the two translators discussed the points of disagreement until a "strong" consensus was reached (see Figure 3).

At this stage, we had a draft version which could be evaluated by a committee of experts and then by a sample of users.

2.4. Methodology for the evaluation of the preliminary french version of the Herth Hope Index survey (HHI-F)

The evaluation of the draft version was carried out in two phases. The first phase involved a panel of experts (n=5) to validate the final translation of the questionnaire. The second phase involved end-users of the questionnaires (n=13) to pre-test the items for comprehension.

The aim of the evaluation of the draft version was to develop a new draft of the translation on the basis of consensus by comparing the german and french versions. The role of the experts was to check rephrasing, grammar, vocabulary and neutral style. This set of verifications would allow a nominal validation of the questionnaire.

2.4.1. Evaluation of the final version by a committee of experts

This phase consisted in calling on a committee of experts to obtain a consensus in the back-translation made in the previous phase and to obtain a final version.

2.4.2. Sample: selection of the expert panel

The face validity method - which we use in this section - suggests the use of experts representative of the target population (Contandriopoulos et al., 2000), chosen according to the different items assessed. We selected a committee of experts to validate the first stage of translation (preparation of the draft version). The inclusion criteria were the same as in the previous stage, i.e. they had significant expertise in the languages of translation (i.e. French and German) and strong mental health skills.

In total, five experts (n = 5) were selected: one associate professor, with a PhD in medicine and bioethics, three professors with PhD in nursing, one senior lecturer specialized in chronic diseases in geriatrics.

2.4.3. Testing for the evaluation of the draft version by the expert committee

We provided our experts with the original and the draft version and asked them whether they found the translated items problematic, insufficient or well translated and consistent. We sought to obtain a consensus from our five experts. The panel of experts then allowed us to determine which translation seemed to be the most relevant.

2.5. Results: Analysis of the evaluation of the draft version by the expert committee

The experts discussed the translations of the items. When they disagreed, they discussed among themselves until a consensus was reached. They all had to agree among themselves for the items to be accepted (see Box 1).

Proposals and discussions by experts
Item 3 Expert 1 « Je me sens seul » Expert 4 « Je me sens **tout** seul » Expert 5 « J'ai un **sentiment de solitude** »
Items 4 Expert 1 « Même dans les situations difficiles, je peux voir **des alternatives** » Expert 2 « Même dans une situation difficile, je peux voir **les possibilités** » Expert 4 « Même dans une situation difficile, je peux voir **des options** »
Items 5 Expert 3 « J'ai une foi ou une confiance intérieure qui me donne **de l'espoir** » Expert 4 « J'ai une foi ou une confiance intérieure qui ne donne **que du défi** »
Items 8 Expert 1 « **J'ai** une force **intérieure** profonde » Expert 2 « **Je dispose** d'une force profonde »
Items 9 Expert 1 « Je suis capable de donner et de recevoir de **l'amour** » Expert 2 « Je suis capable de donner et de recevoir de **l'attention** » Expert 3 « je suis capable de donner et de recevoir de l'amour/**des soins** » Expert 4 « Je peux donner et recevoir **des soins/de l'amour** »
Items 10 Expert 1 « Je **sais généralement** dans quelle direction **je veux aller** » Expert 2 « La plupart du temps, je sais où aller » Expert 3 « Je sais **plus ou moins** quelle direction **je veux prendre** »
Items 12 Expert 2 « **j'ai le sentiment** que ma vie à de la valeur et de l'intérêt » Expert 3 « Je pense que ma vie **est précieuse** et **intéressante** »

Box 1. Example of experts' verbalizations for the comparison of the original and the draft version

2.5.1. Evaluation of the draft version through pre-testing with an end-user panel

The last phase, or pre-test, was to administer the questionnaire to a representative group of the target population.

In order to finalize the translation process, we submitted the consensus version to the end-users in order to determine which items posed problems of comprehension.

Sample: selection of the end-user panel

ISPOR's (International Society for Pharmacoeconomics and Outcomes Research) recommendations for this stage are to use a sample of five to eight people representing the target population, born in the target country(Wild et al., 2005).

We sent an e-mail to the subjects who met the inclusion criteria of our study, namely students at the University of Applied Sciences and Arts Western Switzerland (HES-SO), to request their participation in the study. This e-mail contained an explanation of the research objectives and a web link to a response form with the questionnaire and instructions. A total of thirteen subjects (n=13) responded to our request.

2.5.2. End-user testing of the draft version

We developed a form containing the evaluation items (i.e. the translated items), and we tested it on the model proposed by Rubio and colleagues (2003).

To construct the form, we took the 12 items of the scale and submitted them to the judgement of our sample. They were asked to rate the 'clarity' of all statements. Clarity concerned the form, i.e. the understanding of the questions that were asked.

We used the CVI (*i.e. Content Validation Index*) as a statistical model to analyze the content validity of the scale translation.

Students were asked to rate each statement on a scale that had four points: 1. a statement that was unclear; 2. a statement that needed major revisions to be clear; 3. a statement that needed minor revisions to be clear; and 4. a statement that was clear.

According to Waltz et al. (2005), items with scores of 3 or less are changed according to the experts' suggestions and the test is retaken with the changes at T2. Furthermore, a validity index is acceptable if it

is equal to or greater than 0.80. Finally, the number of experts consulted was greater than ten (n = 13), so the standard error of proportion did not have to be taken into account (Lynn, 1986).

The response form was designed with Microsoft Forms® software, which allows the creation of computerized questionnaires in xml language, thus facilitating statistical analysis and allowing them to be completed remotely in view of current health requirements. The user was able to tick the boxes corresponding to their choices, and was also invited to add comments after each rating to explain their score and to give their opinion on the changes to be made.

The testing methodology consisted of three phases:

1. administering the first test using the form;
2. revision of the tool according to the answers given in step 1;
3. administering a second test with the revised form to check the relevance of the proposed improvements.

The test was administered to the same subjects (n=13) until consensus was reached on all items in the rating scales. Consensus was reached in two rounds (i.e. T1 and T2).

Analysis of the results of the end-user evaluation of the draft version.

The CVI scores were high at T1 due to the methodology already in place upstream (i.e. face validity by a group of experts).

However, we had to make some changes on the form. The students brought criticisms, and proposals for change.

After the changes were implemented we again proposed a version that considered the changes and proposals made by our subjects. All our results were then greater than or equal to .80 after the second test phase (i.e. T2).

In a summary table, we calculated the means at T1 and T2, as well as the CVI, the variations in the mean between the two runs and the percentage change (see Table 2). For example, item III obtained at T1 m = 3.62 and at T2 m = 3.77, which represents respectively an CVI at T1 of .77 and which evolves to 0.92 at T2, which provides a variation in the mean of 4%, and a variation in the CVI of 20% (cf. red box).

Table 2. Expert ratings of the representativeness and clarity of each of the statements in the draft (average per CVI, overall average and percentage change).

Statements	Overall average1	CVI 1	Overall average 2	CVI 2	Overall average variation	Variation CVI
I	3.85	0.85				
II	4.00	1.00				
III	3.62	0.77	3.77	0.92	0.04	0.20
IV	3.31	0.77	3.38	0.92	0.02	0.20
V	3.31	0.85				
VI	3.31	0.77	3.77	0.92	0.14	0.20
VII	3.92	0.92				
VIII	3.46	0.69	3.62	0.92	0.04	0.33
IX	3.77	0.92				
X	3.62	0.92				
XI	3.77	0.85				
XII	3.69	0.85				

At the same time, the comments added by the experts were qualitatively processed through a content analysis. For this purpose, we listed the comments of our users and compared them item by item. This analysis allowed us to reformulate the questions that did not obtain an CVI > 0.80 and they were re-proposed to all the experts until a consensus was reached.

In conclusion, the CVI allowed us to refine the analysis provided by our back-translation methodology and to adapt it to our end-users.

3. Psychometric Assessment Of The Hhi-f

3.1. Methodology

Our total sample was 396 students who met our inclusion criteria - tertiary students - and agreed to participate in our study. Their average age was 23.78 years (min = 19; max = 53). There was a majority of females (n= 252) compared to males (n=144). The majority were single (n=373) and a minority were married, in a common-law relationship (n=19) or divorced (n=4). Furthermore, most did not have children (n=382) and were not cohabiting with an elderly person (n=340). We also note that the majority perceived themselves to be in good health and did not suffer from any chronic diseases (n=371). Most of the students were studying to obtain a bachelor's degree (n=357), and the rest of the sample was distributed between "postgraduate" (n=19), "master's" (n=3) and "other" (n=88). Finally, concerning professional

activity alongside studies, the results were more mixed, with 177 students declaring that they had a job compared to 218 (see Table 3).

Table 3, Descriptive statistics of the sample

Demographic characteristics	n (%)
Sex	
Female	252 (63,64%)
Male	144 (16,36%)
Marital Status	
Single	373 (94,19%)
Married / Common law	19 (4,80%)
Divorced	4 (1,01%)
widower	0 (0%)
Education Level	
Bachelor/License	357 (76,45%)
Post-grade	19 (4,07%)
Master	3 (0,64%)
Doctorat	0 (0%)
Other	88 (18,84%)
Age	
Average	23,78
Minimum	19
Maximum	53
25ème percentile	21
50ième percentile	23
75ième percentile	24
Dependent child(ren)	
Yes	14
No	382
Cohabitation with an elderly person	
Yes	56
No	340
Exercise a student job	

Yes	177
No	218
Chronic Illness	
Yes	25
No	371

3.2 Results: Reliability study

3.2.1. Measuring Fidelity

The Cronbach's alpha for our translation is equal to .850 and attests to good fidelity, since this score is higher than the .70 threshold recommended by Nunnaly (1978). This fidelity score is however lower than the original version of the HHI, since Herth (1992)) obtained an alpha of .97. However, this score is close to other translations of the HHI, such as the German (alpha = .82) (Geiser et al., 2015) or Norwegian (alpha = .81) (Benzein & Berg, 2003).

No item deletion brings any really significant gain. Only items 3 and 6 would result in an alpha of .876 and .869 respectively. It should be noted that these are the two inverted items in the questionnaire.

3.2.2. Factors Analysis

A principal component analysis (PCA) was conducted to test the construct validity of the HHI-F. The objective of the PCA is to check whether the factor structure of our translation is similar to that of the original scale (Herth, 1992).

First, we obtain a Kaiser-Meyer-Olkin (KMO) index of .916, with a highly significant Bartlett's sphericity test ($p < .000$). This allows us to ensure that the HHI-F items are highly correlated with each other.

The Cattell (1966) scree test (Eigenvalues) suggests a 2-component structure for the HHI-F (see. Figure 4). Indeed, the first two components have an eigenvalue greater than 1, with an explanation of variance of 44.69% for the first component, and 9.13% for the second. The third component scores .978 and explains 8.15% of the variance. Nevertheless, after several principal component analyses, on the one hand based on the eigenvalue, and on the other hand based on a fixed number of 3 factors to be extracted in accordance with the number of dimensions of the original HHI scale (Herth, 1992), we do not obtain radically different structures to the one obtained from a PCA based on an eigenvalue higher than 1. Indeed, only item 12 explains a third component, the two other components being explained by the same

items as the PCA based on the eigenvalue. Therefore, we decided to keep the eigenvalue-based PCA that we describe in these results.

Table 4 shows the two-factor Varimax rotation for the 12 HHI-F items, consisting of items 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 for the first factor, and items 11 and 12 for the second factor.

Tableau 4. 2-component Varimax rotation for the 12 HHI-F items

Item	Component	
	1	2
1	**,814**	,102
2	**,801**	,013
3	**,800**	,048
4	**,784**	-,022
5	**,742**	,095
6	**,724**	,044
7	**,696**	,080
8	**,646**	,091
9	**,638**	,050
10	**,606**	,006
11	,023	**,764**
12	,077	**,719**

Also, we do not find the three components that made up the original version of the HHI, which distinguishes items 1, 2, 6 and 11, items 4, 7, 10 and 12, and items 3, 5, 8 and 9. It should be noted, however, that these three components have never been found identically in the various translations of the HHI that have been produced. In fact, during our review of the literature concerning the various translations and validations of the HHI. We note that 3 studies report only 1 factor, (Geiser et al., 2015; Ripamonti et al., 2012; Soleimani et al., 2019; Viana et al., 2010), 4 studies report 2 (Benzein & Berg, 2003; Van Gestel-Timmermans et al., 2010; Wahl et al., 2004; Yaghoobzadeh et al., 2019), 5 studies suggest 3 factors (Aslan et al., 2007; Balsanelli et al., 2010; Chan et al., 2012; Herth, 1992; Hirano et al., 2007; Mousa et al., 2017), and only one study suggests 4 factors (Arnau et al., 2010) (see Table 1).

3.3. Results: Sensitivity Analysis

Contrary to Herth (1992), we obtained a significant difference between the overall HHI-F score and gender ($t(348) = 3.105$, $p < 0.05$), age (Pearson correlation coefficient $r = 0.146$, $p < 0.01$), and the level of education followed ($F(3, 346) = 3.312$, $p < 0.05$).

We also analyzed the influence of other variables than those studied by Hertz (1992). Marital status (single, married or common-law, or divorced) was not significantly related to the HHI-F score (($F2, 347) = 2.019$, $p = .134$). In contrast, there was a significant difference between those with and without children ($t(348) = -2.960$, $p < 0.01$), as was being a working student or not ($t(348) = -3.362$, $p < 0.001$).

3.4. Results: Concurrent Validation

In the literature, the measure of hope is often associated and correlated with other measures of psychological health, such as self-efficacy, optimism, anxiety, depression, problem solving (Delas et al., 2015). For this reason, the HHI will be compared to the following questionnaires: the Depression, Anxiety and Stress Scale (DASS-21) developed by Lovibond et Lovibond (1995)), which assesses mental health status; the Impact of Event Scale-Revised (IES-R) developed by Weiss and Marmar (1997) which assesses the psychological impact of traumatic events; and the Brief Resilient Coping Scale (BRCS) developed by Sinclair and Wallston (2004), which measures coping strategies.

For each of these concurrent validations, we chose to retain the original three-dimensional structure of the HHI (temporality and future; preparation; positive expectations and interconnection). Indeed, even if we do not find the same component structure for the HHI-F as for the HHI, we consider that the validation of the HHI-F should be based on the same assumptions as the original Herth scale.

3.4.1 Correlation between thek HHI-F and the DASS-21scale

The DASS-21 (Lovibond & Lovibond, 1995), which assesses a patient's state of depression, anxiety and stress is a three-dimensional scale with 21 items in its current version. For each item, participants are asked to position themselves on a 4-point Likert scale: 0 = Did not apply to me at all; 1 = Applied to me to some degree, or some of the time; 2 = Applied to me to a considerable degree or a good part of time; 3 = Applied to me very much or most of the time. The scores for each dimension are obtained by adding the scores ticked by the respondents for the corresponding items. Items 3, 5, 10, 13, 16, 17 and 21 are dedicated to the measurement of depression, items 2, 5, 7, 9, 15, 19 and 20 to the measurement of anxiety, items 1, 6, 8, 11, 12, 14 and 18 to the measurement of stress. According to several studies, the DASS-21 has good psychometric characteristics, especially with regard to its factorial validity (Lovibond & Lovibond, 1995; Osman et al., 2012).

For the first concurrent validity study of the HHI-F, we measured the correlation between the 3 dimensions of the HHI-F and the global score, with the scores of the 3 dimensions of the DASS-21. The french version of the DASS-21 that we used is the one proposed by Ramasawmy, Hicks and Gilles (2010).

The results show that all correlations are highly significant (p < .001) for all points of comparison that can be established between the HHI-F and DASS-21 scales (see Table 5).

Table 5. Results of correlations between the 3 dimensions of the HHI-F and its overall score, and the scores on the 3 dimensions of the DASS-21

			HHI-F			
			Global score	Temporality and the future	Preparation	Positive expectations and interconnection
DASS-21	Depression	Pearson correlation	-,562**	-,532**	-,551**	-,413**
		Sig. (two-sided)	,000	,000	,000	,000
		N	350	350	351	351
	Anxiety	Pearson correlation	-,409**	-,385**	-,424**	-,285**
		Sig. (two-sided)	,000	,000	,000	,000
		N	350	350	351	351
	Stress	Pearson correlation	-,405**	-,389**	-,406**	-,288**
		Sig. (two-sided)	,000	,000	,000	,000
		N	350	350	351	351

The results seem consistent, since they indicate systematically negative correlations between the HHI-F and the DASS-21. Indeed, the higher the DASS-21 scores, the more they indicate a deteriorated state of mental health measured through the perception of depression, anxiety and stress. Conversely, the higher the HHI scores, the higher the level of hope. It therefore seems consistent that when a patient reports depression, anxiety and stress, their levels of hope for the future, preparedness and expectations are low.

3.4.1 Correlation between the HHI-F and IES-R Scale

The Impact of Event Scale-Revised (IES-R) developed by Weiss and Marmar (1997) assesses the psychological impact of traumatic events. It consists of 22 items, on which respondents are asked to rate themselves on a 5-point Likert scale, ranging from 0 "Not at all", 1 "Somewhat", 2 "Moderately", 3 "Fairly" to 4 "Extremely". The IES-R distinguishes three dimensions: 1. reliving (items 1, 2, 3, 6, 9, 14, 15 and 20); 2. avoidance (items 5, 7, 8, 11, 12, 13, 17 and 22); 3. hyperactivation (items 4, 10, 15, 18, 19 and 21). The

score for each dimension is calculated by summing the corresponding items. An overall IES-R score is also calculated by adding up all the items. The higher the score, the more severe the symptoms are considered to be.

For the second concurrent validity study of the HHI-F, we measured the correlation between the 3 dimensions of the HHI-F and the global score, with the scores of the 3 dimensions of the IES-R and the global score. The French version of the IES-R that we used is the one proposed by Chiasson et al. (2018).

The results show significant correlations for all points of comparison that can be established between the HHI-F and IES-R scales (see Table 6).

Table 6. Results of the correlations between the 3 dimensions of the HHI-F and its overall score, and the scores of the 3 dimensions of the IES-R and its overall score.

			HHI-F			
			Global Score	Temporality and the future	Preparation	Positive expectations and interconnection
IES-R	Global Score	Pearson correlation	-,301**	-,307**	-,307**	-,189**
		Sig. (two-sided)	,000	,000	,000	,000
		N	350	350	351	351
	Reliving	Pearson correlation	-,267**	-,279**	-,276**	-,157**
		Sig. (two-sided)	,000	,000	,000	,003
		N	350	350	351	351
	Avoidence	Pearson correlation	-,218**	-,237**	-,231**	-,121*
		Sig. (two-sided)	,000	,000	,000	,023
		N	350	350	351	351
	Hyperactivation	Pearson correlation	-,371**	-,352**	-,356**	-,277**
		Sig. (two-sided)	,000	,000	,000	,000
		N	350	350	351	351

As in the concurrent validation with the DASS-21, all correlations between the IES-R and the HHI-F are negative. This can be explained by the fact that the more the psychological impact of the event is perceived as high by the patient and therefore traumatic, the more his hopes for the future, preparation and positive expectations decrease. These results are consistent.

3.4.2 Correlation between the HHI-F and the BRCS Scales

The Brief Resilient Coping Scale (BRCS) (Sinclair & Wallston, 2004) measures coping strategies. It consists of 4 items on which the patient is asked to position himself on a 5-point Likert scale, ranging from 1: "Does not describe me at all" to 5: "Describes me completely". The overall BRCS score is calculated by adding the scores of the 4 items. The higher the score, the greater the patient's resilience.

For the third concurrent validity study of the HHI-F, we measured the correlation between the three dimensions of the HHI-F and the global score, with the BRCS score. The French version of the BRCS that we used is the one proposed by Ionescu (2011).

The results show significant correlations for all points of comparison that can be established between the HHI-F and BRCS scales (see. Table 7).

Table 7. Results of the correlations between the 3 dimensions of the HHI-F and its overall score, and the BRCS score

		HHI-F			
		Global Score	Temporality and the future	Preparation	Positive expectations and interconnection
BRCS	Pearson correlation	,552**	,453**	,540**	,479**
	Sig. (two-sided)	,000	,000	,000	,000
	N	350	350	351	351

The positive correlations attest to the validity of the HHI-F scale. Indeed, these results mean that the more coping strategies are developed in patients, the greater their sense of hope, which is a consistent link between these two psychological health factors.

4. Discussion And Research Perspectives

4.1. Analysis of the preparation of the HHI-F translation

The results obtained by our methodology are satisfactory. Indeed, they reveal a consensus within our committee of experts and a good acceptance by our user panel.

We also note that the originality of our approach, using not only a qualitative agreement between the experts, but also a quantitative one through the diverted use of an anti-plagiarism software (Copyleaks®), allowed us to improve the evidence in favour of a consensus and to increase our analysis capacities. Moreover, the good results obtained in the following phases: (1) evaluation of the final version by the committee of experts and by the panel of users; (2) psychometric analyses, seem to demonstrate the usefulness of such an approach.

It seems to us, that methods of translating measurement tools could make use of translation and textual similarity checking technologies that use powerful statistics (IA) to identify lexical fields, synonyms and syntactic contexts, etc. These tools could improve the quality of the translation phase and give additional information to the expert committee in favour or not of a consensus, and thus increase the results of the psychometric analysis.

4.2. Analysis of the components of the HHI-F

The results show a 2-factor structure of the HHI-F, consisting of items 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10 on the one hand and items 11 and 12 on the other. Thus, the following statements : "I believe that every day brings new opportunities " (item 11) and " I feel that my life has value and worth" (item 12) stand out from the other headings. Although this factorial structure has never been found among translations of the HHI, we can nevertheless put forward some explanations, specific to our french translation.

It seems that the headings of items 11 and 12 can be understood as an optimistic perception of life and existence in general. These two headings refer to events external to the individual (life, opportunities) which can be perceived as elements over which the subject has no direct control. This aspect of hope is different from that formulated in most of the other headings, which question the subject more about his or her ability to cope with difficult events and about his or her qualities of perceiving hope despite adversity: "Even in a difficult situation, I can find other options" (item 4) or "I know most of the time which way to go" (item 10).

It is also possible that our results regarding the factor structure of the HHI-F are influenced by our sample of respondents. Indeed, we deliberately interviewed higher education students who had been subjected to the measures put in place by governments to stop or slow down the transmission of the virus responsible for the COVID-19 pandemic, such as the closing of schools and the introduction of distance learning, generalized quarantine, the introduction of social distancing, the almost complete cessation of recreational and cultural activities, etc. Therefore, we did not cover the same profiles as those interviewed for the construction of the original HHI scale. Indeed, Herth (1992) had constituted a sample of patients suffering from chronic and/or acute illnesses, or in terminal phase. In our case, the students could not be considered as patients, and we only questioned them on having or not a chronic illness. Furthermore, only 25 students out of 396 (6.3%) (see Table 3) reported having such an illness. Therefore, our sample probably did not respond in the same way as Herth's sample.

4.3. Concurrent validation Analysis

The different concurrent validations we conducted obtained correlation scores that were always highly significant with the DASS-21 (Ramasawmy et al., 2010), IES-R (Chiasson et al., 2018) and BRCS (Ionescu, 2011) scales. We also found that the direction of the correlation coefficients, positive or negative, were always consistent. For example, the overall scores on the HHI-F and IES-R scales were negatively correlated with r = -301, indicating that the more the respondents considered that they had been impacted by traumatic events, the lower their perception of hope.

These results also allow us to validate the reliability of our translation of the HHI. Indeed, we did not obtain any discordant results that could have called into question the translation of one or more items. On the contrary, we can affirm that the HHI-F complements other scales measuring psychological health, translated and validated in french.

5. Conclusion And Research Perspectives

As we have seen previously, the majority of studies that take into consideration the measurement of hope is based on a public of people with serious health conditions or in contexts of serious events (e.g. war, chronic or acute illness, terminal phase, etc.). Our validation, with this population is therefore important for the continuation of this work and the understanding of the experience of hope.

Nevertheless, today's society is changing rapidly, and new challenges are being imposed on the new generation: climate change, unemployment and social protest, pandemics, technological revolution, etc. The measurement of hope may therefore be a fundamental dimension of the mental health and/or quality of life and well-being of this population. This measure can then be interesting in clinical practice, in the short term to detect current problems or in the medium and long term to anticipate future difficulties. This is why we believe that the dimensions of hope should be systematically studied during mental health assessments in young people, and that carers should be trained in this assessment (Viana et al., 2010). This approach will allow us to improve the evidence in favour of the validation of the HHI-F scale.

6. List Of Abbreviations

- HHI Hertz Hope Index
- HHI-F Hertz Hope Index – French
- COVID-19 CoronaVirus Induced Disease 2019
- DASS-21 Depression, Anxiety and Stress Scale
- IES-R Impact of Event Scale-Revised :
- BRCS Brief Resilient Coping Scale
- CVI Content Validation Index

7. Declarations

7.1. Ethical Approval and Consent to participate

The ethical rules and considerations followed the international Helsinki guidelines [45]. Applications for ethical approval were obtained from the Swiss Research Ethics Committees - Swissethics (Project ID: 2020-02889).

Personal data were processed in accordance with the EU General Data Protection Regulation (RGPD2016/679) and Swiss data protection law (LPD https://www.fedlex.admin.ch/eli/fga/2020/1998/fr). All participants were informed: of the purpose of the study; that participation was voluntary; that they could leave the study at any time; and, that all data would be treated confidentially. By responding and submitting the electronic survey, participants gave their consent to participate in the study. Similarly, independent informed consent was provided to students participating in the study groups, stating the same principles of anonymity and confidentiality.

The processing and analysis of the quantitative data was carried out by the research team and the management of the files is the responsibility of the principal investigator.

7.2. Consent for publication

Not applicable.

7.3. Availability of supporting data

The datasets and materials used and/or analysed in this study are available from the corresponding author upon request. However, this request must respect our ethical commitments to the CER-VD.

7.4. Competing interests

All authors of this study declare that they have no conflicts of interest in relation to this research or the publication of the results.

7.5. Funding

The study was financed by a collaborative fund between the HES-SO, the University of Applied Sciences and Arts of Western Switzerland and LIST.

The funders did not in any way influence the study (hypothesis, methodology, etc.), or the analysis and presentation of the results.

7.6. Authors' contributions

All authors (DA, GG, FS, TCN) contributed significantly to the set-up of the study, jointly identifying the research questions and designing the study and setting up the data collection. The manuscript was drafted by (DA and GG), while all authors (DA, GG, FS, TCN) provided critical review of the paper in terms of important intellectual content. All authors (DA, GG, FS, TCN) read and approved the final version submitted.

7.7. Acknowledgements

Not applicable.

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Annexe 1 Questionnaire Final Français

1. J'ai une vision positive de la vie.
2. Réponse requiseChoix multiplesJ'ai des objectifs à court et/ou à long terme.
3. Réponse requise Je me sens souvent seul.
4. Réponse requise Même dans une situation difficile, je peux trouver d'autres options.Choix multiples
5. J'ai une foi ou une confiance intérieure qui me donne de l'espoir.
6. Réponse requiseJe suis anxieux face à l'avenirChoix multiples.
7. Je peux me rappeler des moments heureux.
8. J'ai une force intérieure importante.
9. Je suis capable de donner et de recevoir de l'amour/des soins.
10. Réponse requise Je sais la plupart du temps dans quelle direction aller.
11. Réponse requiseChoix multiples Je crois que chaque jour offre de nouvelles opportunitésRéponse requise.
12. Je sens que ma vie a de la valeur et de l'intérêt.

Figures

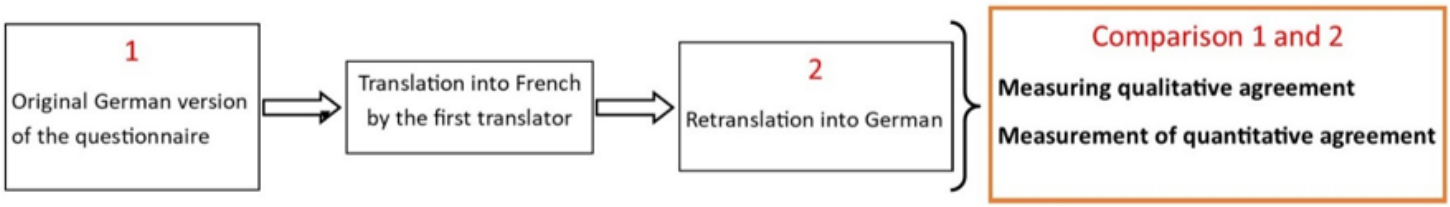

Figure 1

Representation of the back-translation method.

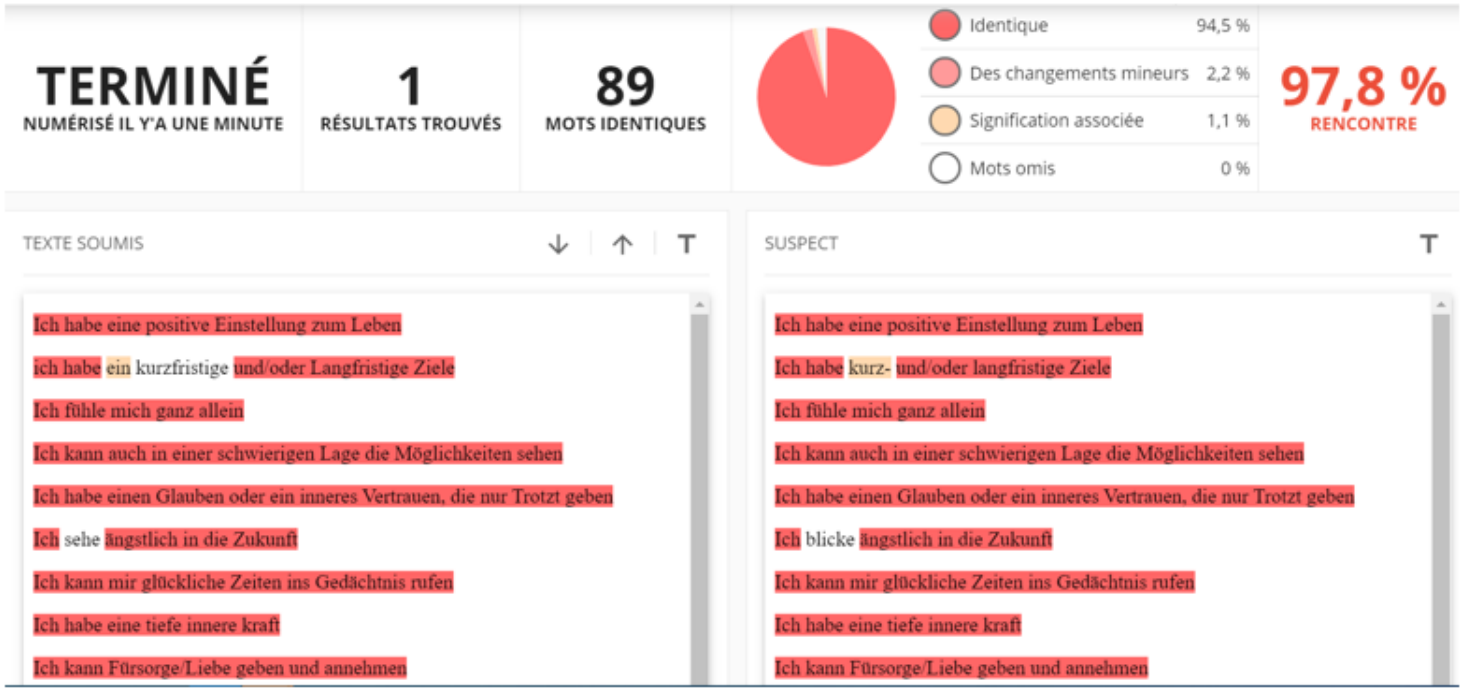

Figure 2

Similarity analysis between the original version and the retranslation of the Herth Hope Index (HHI) questionnaire carried out by the Copyleaks software

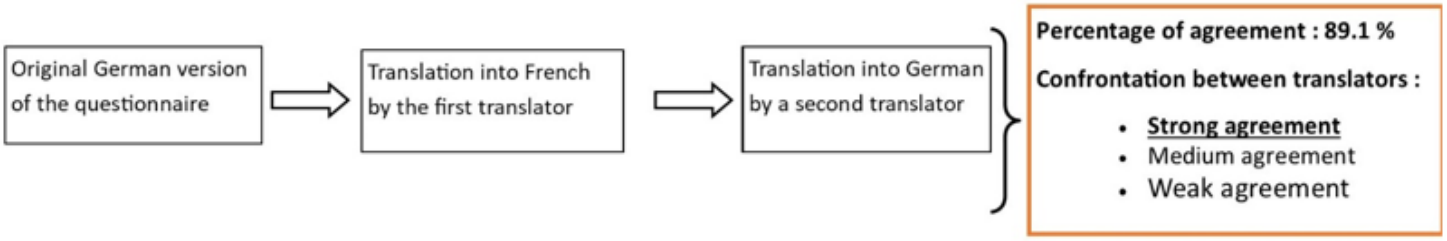

Figure 3

Representation of the results obtained with the back-translation method for the Herth Hope Index (HHI) survey.

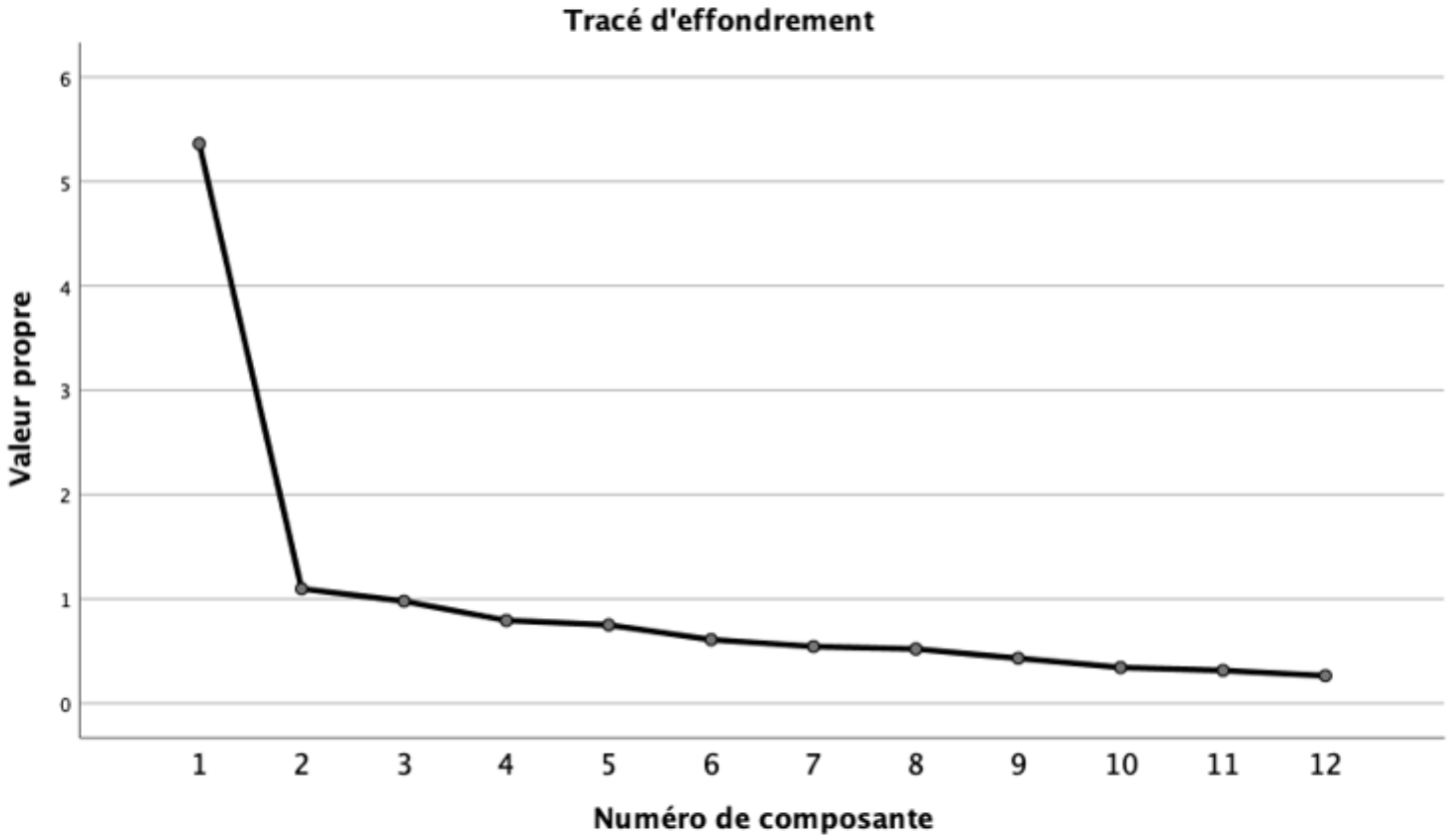

Figure 4

HHI-F collapse plot, suggesting a two-component structure