

## RELIABILITY AND VALIDITY OF A TRANSLATED MUSIC INVENTORY IN A SMALL SAMPLE

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**Abstract:** *The present study sought to investigate the MUSIC inventory reliability and structure validity. Previous research developed on various samples indicated that the instrument proved to be an instrument with good or excellent Cronbach's Alpha values for each scale and despite some higher correlation between these scales, its structure validity was considered acceptable. Considering these good results, the MUSIC inventory, due to its length (only 26 items) and simple way to get answers can be a useful instrument in any quantitative research preoccupied to determine motivational aspects in an academic setting. Because of these previous findings, MUSIC inventory was considered an instrument that could be translated and tested on a Romanian sample. The hypothesis was that the students' perceptions measured using MUSIC inventory would prove the reliability and construct validity of the translated version. The sample of this study consisted of a voluntary group of 28 students who studied the Psychology of education in the first year of the psychopedagogical module, from several specializations. The study had a cross-sectional design. The search of results for this study was accomplished through various types of statistical analyses: reliability analysis (Cronbach's Alpha), factor analysis and correlation analysis. Interpretation of results from this study suggested that the hypothesis of the study was only partially confirmed, reliability was proved by Cronbach Alpha coefficients are excellent (above 0.9) for Usefulness and Interest scales and good (between 0.7-0.9) for the remaining three scales, but, on the other hand, construct validity of the inventory was not confirmed by the results obtained in the present study.*

**Keywords:** *MUSIC inventory; reliability; validity.*

## Background

Motivation is the main factor that orientates children behaviors in school and proved to be relevant for their academic success (Robbins et al., 2004). Given the importance of motivation in school related activities and its positive effect on academic results different authors developed several motivation scales, such as: Ryan and Deci (intrinsic motivation), Guay, Vallerand and Blanchard (Situation Motivation Scale), Harter (Scale of Intrinsic Versus Extrinsic Orientation in the Classroom) (Nortje, 2021). Despite the abundance of already existing motivation scales, new scales on this psychological process continue to be tested and in the present article the focus is drawn upon the MUSIC inventory (Jones, 2022). The author's publications indicate a long and constant effort dedicated for many years. At the beginning of his book „Motivating students by Design: Practical strategies for Professors Jones D. Brett proposes a definition of the motivation as the „extent to which one intends to engage in an activity” and then explains each concept: extent as a magnitude, intent as goal-directed behaviors, engagement as a measure of behavioral and cognitive effort done by a person, activities as specific activity the person is interested in (Jones, 2018). In the same book Jones D. Brett proposes a relationship between these concepts, also relating these concepts to the five factors of MUSIC inventory:

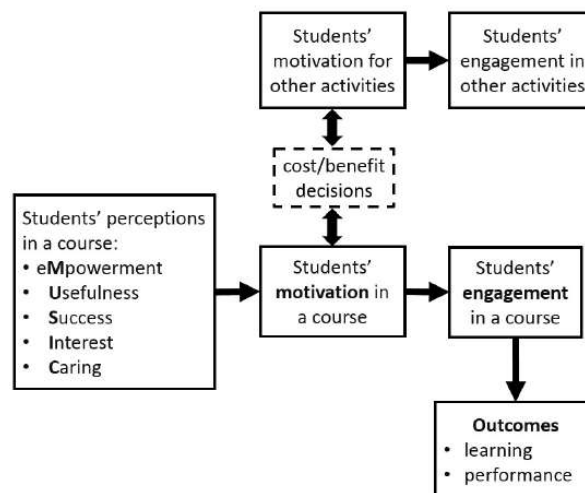


Fig. 1. The relationship between students MUSIC perceptions and their motivation, engagement, and outcomes (Jones, 2018, pg. 10)

The justification for the MUSIC model is considered its ability to improve the motivation, that later is related to higher engagement and leads to more effort done by students to learn and finally all these would lead for a higher academic succes. The model is considered that could offer a tool for a better control of school related activities although some external conditions are not in its central

focus. In conclusion, the main goal of the MUSIC model is to enable teachers to consider any changes in teaching that could have a beneficial effect on students so that they would get a higher level of motivation, engagement and academic knowledge and skills. Several articles proved that the MUSIC inventory has a good validity (Jones et al., 2019, 2021; Jones & Sigmon, 2017; Jones & Skaggs, 2016, Jones & Wilkins, 2023; Pace et al., 2016).

### Hypothesis

Students' perceptions measured using MUSIC inventory would prove the reliability and construct validity of the translated version applied to 28 Romanian students.

### Research design

This study follows a cross-sectional design aimed at conducting a correlational type of research.

### Sample

This study was conducted in the first semester of the academic year 2020-2021 on a voluntary group of students who studied the Psychology of education in the first year of the psycho-pedagogical module. The questionnaire was distributed in the last week of the first semester, and 107 students were invited to participate. Of these, 28 completed the questionnaire received. The mean age of the sample was  $M = 27.50$  (S.D. = 10.871). Given the high value of the standard deviation, the value of the median (19.50) and the mode (19) were also calculated. These values indicate a group with significant age differences between its members, the minimum value being 18 years and the maximum 50 years. The distribution of frequencies by sex indicated 19 females and 9 males. The mean age for female students was  $M = 26.63$  (S.D. = 11,558) and for male students  $M = 29.33$  (S.D. = 9,631). The calculation of the significance of the difference between the two means (T-test Independent Sample) indicated that although there is a difference of almost 3 years between the means, there was no statistically significant age difference between the two subgroups (students):  $t(26) = -0.607$ ,  $p = .549$ .

A Crosstab-type analysis using age and sex variables indicated the following frequencies (Table 1):

**Table 1. Crosstab analysis for variables Sex \* Age**

		Age											Total	
		18	19	20	28	31	32	35	37	42	43	48		50
Sex	Feminin	2	9	1	1	1	0	1	0	1	1	0	2	19
	Masculin	0	3	0	1	2	1	0	1	0	0	1	0	9

Total	2	12	1	2	3	1	1	1	1	1	1	2	28
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And, a Crosstab-type analysis that used the variables specialization and sex indicated the following frequencies (Table 2):

**Table 2. Crosstab analysis for variables Specialization \* Sex**

		Sex		Total
		Feminin	Masculin	
Specializarea	Administrație publică	2	0	2
	Asistență socială	3	0	3
	Drept	1	1	2
	Educație fizică și sportivă	2	6	8
	Kinetoterapie și motricitate specială	3	1	4
	Sociologie	1	1	2
	Terapie ocupațională	7	0	7
Total	19	9	28	

### Instruments

The tool used was the MUSIC inventory. In the User Guide for Assessing the Components of the MUSIC® Model of Motivation, the author, Jones D. Brett, enumerates the inventory principles/scales: Empowerment, Usefulness, Success, Interest and Caring. Although the inventory evolved and were developed shorter versions (of 20 or 19 items) in this study the original 26 items inventory was used. The inventory uses a 1 to 6 rating scale, each number being associated a verbal description. Each principle is measured by a number of items:

- Empowerment score = (item 2 + item 8 + item 12 + item 17 + item 26) / 5
- Usefulness score = (item 3 + item 5 + item 19 + item 21 + item 23) / 5
- Success score = (item 7 + item 10 + item 14 + item 18) / 4
- Interest score = (item 1 + item 6 + item 9 + item 11 + item 13 + item 15) / 6
- Caring score = (item 4 + item 16 + item 20 + item 22 + item 24 + item 25) / 6

The inventory was used in several large studies (Jones et al., 2021, 2022; Jones & Wilkins, 2023)

In this study the MUSIC inventory was translated by two translators in Romanian; these translations were merged through a synthesis by a committee

(two translators, previously mentioned, and an expert in the field) and finally, the Romanian version was translated again in English by another translator and a second expert in the field.

### Results

In order to be able to perform the analyses needed to test the hypothesis, it was necessary that answers from the survey be converted into numerical variables and scores for all five principles/scales calculated. These calculated scores were used in the descriptive statistics and in the correlation analysis (Table 3 and Table 6).

**Table 3. Descriptive statistics for the MUSIC inventory five scales**

	N	Minimum	Maximum	Mean	Std. Deviation
Empowerment score	28	2,80	6,00	4,5929	,87345
Usefulness score	28	3,40	6,00	4,8857	,87674
Success score	28	2,25	6,00	4,5089	,95617
Interest score	28	3,17	6,00	4,7381	,95304
Caring score	28	3,17	6,00	5,2024	,75816

**Table 4. Reliability Statistics - Cronbach's Alpha**

	N	Cronbach Alpha	Number of items
Empowerment score	28	,833	5
Usefulness score	28	,916	5
Success score	28	,877	4
Interest score	28	,914	6
Caring score	28	,859	6

In this study were used same criteria as those provided by Kline (2016) to evaluate the alpha values of the five MUSIC scales: above 0.9 / excellent, 0.7 - 0.9 / good, between 0.6 -0.7 /acceptable, and below 0.6 / unacceptable.

**Table 5. Factor analysis for the MUSIC inventory scales - Component Matrix<sup>a</sup>**

	Component			
	1	2	3	4
TM_1_nr	<b>,882</b>	,246	,060	,011
TM_2_nr	<b>,684</b>	,220	,322	-,234
TM_3_nr	,619	,121	<b>-,680</b>	,121
TM_4_nr	,543	<b>,546</b>	-,219	,442
TM_5_nr	<b>,739</b>	-,147	-,357	,295
TM_6_nr	<b>,816</b>	,169	-,284	,222
TM_7_nr	<b>,578</b>	-,180	-,525	-,068
TM_8_nr	<b>,661</b>	-,296	,541	,245
TM_9_nr	<b>,887</b>	-,261	,082	,034
TM_10_nr	<b>,856</b>	-,176	,083	-,023
TM_11_nr	<b>,843</b>	,062	,057	,274
TM_12_nr	<b>,595</b>	-,393	,480	,331
TM_13_nr	,664	<b>-,677</b>	,121	,139
TM_14_nr	<b>,736</b>	-,409	,155	-,206
TM_15_nr	<b>,784</b>	-,249	,308	-,274
TM_16_nr	<b>,590</b>	,532	,320	-,324
TM_17_nr	<b>,835</b>	,004	-,038	-,168
TM_18_nr	<b>,793</b>	-,246	-,352	-,004
TM_19_nr	<b>,871</b>	-,254	-,266	-,159
TM_20_nr	<b>,774</b>	,238	,057	-,381
TM_21_nr	<b>,850</b>	-,187	-,253	-,177
TM_22_nr	<b>,674</b>	,664	,110	,100
TM_23_nr	<b>,825</b>	,046	-,148	-,306
TM_24_nr	<b>,638</b>	,244	,480	,288
TM_25_nr	,428	,262	,060	<b>,457</b>
TM_26_nr	,578	<b>,623</b>	,060	-,216

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

The factor analysis of the MUSIC inventory was performed without specifying in the analysis to be done for 5 factors (as its theoretical model indicates); the analysis identified only 4 components/factors.

**Table 6. Correlation analysis for the MUSIC inventory scales**

		Empowerment score	Usefulness score	Success score	Interest score	Caring score
Empowerment score	Pearson Correlation	1	,585**	,687**	,813**	,683**
	Sig. (2-tailed)		,001	,000	,000	,000
	N	28	28	28	28	28
Usefulness score	Pearson Correlation	,585**	1	,808**	,823**	,588**
	Sig. (2-tailed)	,001		,000	,000	,001
	N	28	28	28	28	28
Success score	Pearson Correlation	,687**	,808**	1	,819**	,493**
	Sig. (2-tailed)	,000	,000		,000	,008
	N	28	28	28	28	28
Interest score	Pearson Correlation	,813**	,823**	,819**	1	,695**
	Sig. (2-tailed)	,000	,000	,000		,000
	N	28	28	28	28	28
Caring score	Pearson Correlation	,683**	,588**	,493**	,695**	1
	Sig. (2-tailed)	,000	,001	,008	,000	
	N	28	28	28	28	28

\*\* . Correlation is significant at the 0.01 level (2-tailed).

## Discussion

Hypothesis of this study is only partially confirmed; there are several studies that indicate that different variants of the MUSIC inventory is a reliable instrument and results obtained in this study also indicate that Cronbach Alpha

coefficients are excellent (above 0.9) for Usefulness and Interest scales and good (between 0.7-0.9) for the remaining three scales (see table 4). On the other hand, construct validity of the inventory is not confirmed by the results obtained in the present study.

Comparing to previous results (Jones et al., 2019) in this study correlation coefficients are much higher. Jones et al. presented a table with correlation coefficients obtained in three studies and mentioned that their criteria to interpret these coefficients were: „large effect size (0.50 or greater), ... medium effect size (0.30 to 0.49), ...small effect size (0.10 to 0.29)”. Taking in consideration these criteria for the present results indicate that one coefficient indicates a medium size effect (between Success and Caring scales) and all the remaining associations indicate a large effect size (see Table 6).

Further, the factor analysis, considering more aspects, had an unexpected result. First of all, the analysis did not find 5 scales but only 4. The statistical software has the option to impose a specific number of scales/components but this option was not used during the statistical analysis because its purpose was to check if the 5-scale structure would result without imposing it as a condition. Secondly, among the four scales identified through the factor analysis, factor/component „1” presented the highest loading for 21 items (marked in bold in Table 5, column 1), factor/component „2” had only 3 items with highest load (Items 4, 13 and 26) the third and fourth factor/component had only one item with the highest load (Item 3, respectively, Item 25; items are marked in bold in column 3 and 4). Thirdly, these items that had the highest load on factors/components „2”, „3” and „4” had also a high load on factor/component „1” and these are considered problematic items.

Last two analyses, correlation analysis and factor analysis do not confirm the expected construct validity of the MUSIC inventory. Comparing to previous studies that confirmed the construct validity of the MUSIC inventory, the previous study used a smaller sample and also a translated version of this instrument. Because the translation was carefully accomplished by a group of translators and two specialists in this area, the most probable cause for these results different from the previous one, was the smaller sample size.

### **Conclusion:**

The MUSIC inventory is considered a reliable instrument that has both excellent or good Cronbach’s Alpha coefficients and a good structure validity but, in this study the structure validity was not confirmed, most probably due to the sample size; so that, using this inventory on small samples should be followed by checking its reliability and structure validity.



## MUSIC Inventory

- To be administered while the student is enrolled in college
- Use the instructions below. Title the survey following the directions in a prior page of this User Guide. Also, use the directions on a prior page for how to format the 1 to 6 scale.

### Instructions

Thinking about the [insert name of major or program] course(s) you have taken and are currently taking in your academic major (i.e., [insert specific majors]), please rate your level of agreement or disagreement with the following statements using the following scale:

1 Strongly disagree	2 Disagree	3 Somewhat disagree	4 Somewhat agree	5 Agree	6 Strongly agree
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There are no right or wrong answers for these questions. Please answer them honestly. Some of the questions might seem repetitive, but it is important that you answer them all to obtain the best possible results.

Also, note that the word "coursework" refers to anything that you did in these courses, including assignment, activities, readings, etc.

- \_\_\_\_\_ 1. The coursework holds my attention.
- \_\_\_\_\_ 2. I have the opportunity to decide for myself how to meet course goals.
- \_\_\_\_\_ 3. In general, the coursework is useful to me.
- \_\_\_\_\_ 4. The instructors are available to answer my questions about the coursework.
- \_\_\_\_\_ 5. The coursework is beneficial to me.
- \_\_\_\_\_ 6. The instructional methods used in the courses hold my attention.
- \_\_\_\_\_ 7. I am confident that I can succeed in the coursework.
- \_\_\_\_\_ 8. I have the freedom to complete the coursework my own way.
- \_\_\_\_\_ 9. I enjoy the instructional methods used in the courses.
- \_\_\_\_\_ 10. I feel that I can be successful in meeting the academic challenges in the courses.
- \_\_\_\_\_ 11. The instructional methods engage me in the courses.
- \_\_\_\_\_ 12. I have options in how to achieve the goals of the courses.
- \_\_\_\_\_ 13. I enjoy completing the coursework.
- \_\_\_\_\_ 14. I am capable of getting a high grade in the courses.
- \_\_\_\_\_ 15. The coursework is interesting to me.
- \_\_\_\_\_ 16. The instructors are willing to assist me if I need help in a course.
- \_\_\_\_\_ 17. I have control over how I learn the course content.
- \_\_\_\_\_ 18. Throughout the courses, I have felt that I could be successful on the coursework.
- \_\_\_\_\_ 19. I find the coursework to be relevant to my future.
- \_\_\_\_\_ 20. The instructors care about how well I do in their courses.
- \_\_\_\_\_ 21. I will be able to use the knowledge I gain in the courses.
- \_\_\_\_\_ 22. The instructors are respectful of me.
- \_\_\_\_\_ 23. The knowledge I gain in the courses is important for my future.
- \_\_\_\_\_ 24. The instructors are friendly.
- \_\_\_\_\_ 25. I believe that the instructors care about my feelings.
- \_\_\_\_\_ 26. I have flexibility in what I am allowed to do in the courses.

(Jones, 2022)

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