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A Cross-Cultural Validation of the MUSIC® Model of Academic Motivation Inventory: Evidence from Chinese- and Spanish-Speaking University Students

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Abstract

The purpose of this study was to examine the extent to which Chinese and Spanish translations of the College Student version of the MUSIC® Model of Academic Motivation Inventory (MUSIC Inventory; Jones, 2012) demonstrate acceptable psychometric properties. We surveyed 300 students at a university in China and 201 students at a university in Colombia using versions of the MUSIC Inventory that were translated into Chinese and Spanish, respectively. To assess the psychometric properties of the inventory, we examined: (a) the internal consistency reliabilities for all of the scales, (b) the fit indices and factor loadings produced from confirmatory factor analysis, and (c) correlations between the MUSIC Inventory scales and behavioral and cognitive engagement. The results provide evidence that the Chinese and Spanish translations of the MUSIC Inventory demonstrate acceptable psychometric properties for use with undergraduate students. Therefore, instructors and researchers can use the translated inventories to assess students' perceptions of the five MUSIC® Model of Motivation components.

Keywords: MUSIC Model of Motivation, motivation, engagement, assessment, motivating students

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Validación Transcultural del Cuestionario del Modelo de Motivación Académica MUSIC®: Evidencia proveniente de Estudiantes Universitarios de Habla Hispana y China

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Resumen

El propósito de este estudio era determinar en qué medida se cumplían las propiedades sicométricas de las traducciones al dhino y al español de la versión para estudiantes universitarios del cuestionario de motivación académica MUSIC (MUSIC Inventory; Jones, 2012). Encuestamos 300 estudiantes de una universidad en China y 201 estudiantes de una universidad en Colombia usando versiones del cuestionario MUSIC traducidas al chino y al español, respectivamente. Para medir las propiedades sicométricas del cuestionario, examinamos: a) La confiabilidad de consistencia interna para todas las escalas b) los índices de ajuste y peso de los factores producidos a partir de un análisis factorial confirmatorio, y (c) las correlaciones entre las escalas del cuestionario MUSIC y el involucramiento conductual y cognitivo. Los resultados proveen evidencia que tanto las traducciones al chino como al español del cuestionario MUSIC demuestran aceptables propiedades sicométricas para su uso con estudiantes de pregrado. Por tanto, profesores e investigadores pueden usar los cuestionarios para medir las percepciones de los estudiantes de los 5 componentes del modelo de motivación académica MUSIC.

Palabras clave: Modelo de motivación académica *MUSIC,* involucramiento, evaluación, motivación de estudiantes

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The MUSIC® Model of Motivation (abbreviated as the "MUSIC model"; Jones, 2009, 2015) is a multidimensional model that instructors can use to design courses to engage students in learning. The MUSIC model was developed to help teachers apply current research and theories related to motivation and engagement. The basic principles of the MUSIC model are that the instructor needs to ensure that students: (1) feel *eMpowered* by having the ability to make decisions about some aspects of their learning, (2) understand why what they are learning is *Useful* for their short- or long-term goals, (3) believe that they can *Succeed* if they put forth the effort required, (4) are *Interested* in the content and instructional activities, and (5) believe that the instructor and others in the learning environment *Care* about their learning and about them as a person (MUSIC is an acronym for these principles; Jones, 2009, 2015). Thus, the MUSIC model is an organizational framework for instructional strategies that teachers can use to motivate and engage students.

Empirical studies have documented that the MUSIC model components are distinct constructs in samples of undergraduate students (Jones, Osborne, Paretti, & Matusovich, 2014; Jones & Skaggs, 2016; Jones, Tendhar, & Paretti, 2015; Jones & Wilkins, 2013). In addition, the MUSIC model components have been shown to predict aspects of students' motivation and engagement (Jones, 2010; Jones et al., 2014; Jones et al., 2015). For example, Jones (2010) found that the course format (face-to-face or online) and gender were factors that affected which components of the MUSIC model predicted students' behavioral engagement.

The MUSIC model can be used in several ways to help teachers improve their instruction. For example, after instruction has occurred (e.g., an instructional activity, a class, a course), it can be helpful for instructors to assess how students perceived the instruction related to each of the five MUSIC model components. Instructors can then use this feedback to improve their course by redesigning it (Jones, 2015). To assess students' perceptions of the MUSIC components, it is necessary to measure students' perceptions. One means to accomplish this is to ask students to complete a self-report questionnaire with items related to each of the MUSIC model components. To do this, some researchers have pieced together scales from various instruments to assess students' perceptions of the MUSIC model

components after instruction (e.g., Jones, 2010; Jones, Epler, Mokri, Bryant, & Paretti, 2013; Jones, Watson, Rakes, & Akalin, 2012; McGinley & Jones, 2014); however, using a variety of instruments is not ideal for several reasons. For example, the instruments tend to be written by different individuals at different times for different purposes. As a result, the items can vary with respect to the types of items (e.g., questions, statements), number of response options (e.g., on a Likert-format scale ranging from 1 to 5, 1 to 6, or 1 to 7), and the labels provided on the Likert-format response options (e.g., *strongly agree*, *very interested*). Also, the tone and style of the items can vary when the items are written by different individuals. These differences may confuse students while they are responding to the items and can make it difficult for the instructor to compare results across scales.

To address these issues, Jones (2012) developed the MUSIC® Model of Academic Motivation Inventory (abbreviated in this article as the "MUSIC Inventory") that can be used to assess students' perceptions of each of the five MUSIC model components. The MUSIC Inventory (College Student version) consists of items that are divided into five scales: empowerment, usefulness, success, interest, and caring. Students respond to the scale items using the same Likert-format options. The items in each scale are averaged to create a mean scale score.

The College Student version of the MUSIC Inventory has been shown to produce valid scores with samples of undergraduate students (Jones & Skaggs, 2016; Tendhar, 2015). For example, Jones and Skaggs (2016) assessed undergraduate students' perceptions of many different types of courses to provide validity evidence for the use of the MUSIC Inventory with college students. They used classical item analysis, factor analysis, correlations with similar scales, and Cronbach's alpha values to demonstrate the validity of the scores produced by the MUSIC Inventory. They documented that the five-factor MUSIC model fit the data well and reported excellent Cronbach's alpha values of .91 for empowerment, .96 for usefulness, .93 for success, .95 for interest, and .93 for caring.

Because of the successful psychometric properties of the College version of the MUSIC Inventory, there was a demand for its use in other populations besides college students. Consequently, the MUSIC Inventory was modified for use with elementary school students (Jones & Sigmon, 2016), middle and

high school students (Jones & Wilkins, 2015; Parkes, Jones, & Wilkins, 2015), and professors (Jones, 2015) (see Jones, 2012, for all of the available versions). In addition, there was a demand for its use by students whose native language was not English; as a result, the MUSIC Inventory has been translated to Icelandic (Schram, 2015) and Arabic (Mohamed, Soliman, & Jones, 2013), and has been shown to demonstrate acceptable psychometric properties.

Purpose and Research Question

Given that the College Student version of the MUSIC Inventory has been successfully translated from English to Icelandic and Arabic, we hypothesized that this version could also be translated from English to Chinese and Spanish. If the translation was successful, it would demonstrate not only the acceptable psychometric properties of the MUSIC Inventory in these languages, but it would also demonstrate that the MUSIC model is generalizable to cultures besides American (Jones & Skaggs, 2016), Icelandic (Schram & Jones, 2016), and Egyptian (Mohamed et al., 2013) cultures. Consequently, our primary research question was: Do Chinese and Spanish translations of the College Student version of the MUSIC Inventory demonstrate acceptable psychometric properties? If so, the translated versions of the MUSIC Inventory could be used by instructors and researchers to assess students' perceptions of the MUSIC model components. Furthermore, it would provide evidence that the MUSIC model is generalizable to at least some Chinese and Hispanic cultures.

Method

Participants

Chinese-speaking participants. The Chinese-speaking participants included undergraduate students from a large university in central China. Students were enrolled in one of five majors within the School of Business. Of the 348 students who were invited to participate in the study, 300 students participated, yielding an 86.2% response rate. More of the students were female (183 students = 61.0%) than male (117 = 39.0%). The majority of the participants reported that they were Han nationality (n = 296, 98.7%), whereas four participants (1.3%) reported they were one of the minority nationalities. Regarding their class standing, 75 (25.0%) were first-year students, 97 (32.3%) were sophomores, and 128 (42.7%) were juniors.

Spanish-speaking participants. The Spanish-speaking participants included undergraduate students from a large university in Colombia. Students were enrolled in one of three majors within the School of Engineering. The number of Spanish-speaking participants was 201, with most students from the Electrical Engineering (EE) major (146 = 72.6%) and the remaining 55 students (27.4%) from the Systems Engineering (SI) and Industrial Engineering (IE) majors. The response rate was 25.2% (n = 146 out of 579) from EE and 3.1% (n = 55 out of 1,726) for SI and IE. One-third of the students (67 = 33.3%) were female and two-thirds 134 (66.7%) were male. All participants reported Colombian nationality. Participants were split across the five class standings, with 30 (14.9%) first-year, 46 (22.9%) second-year, 30 (14.9%) third-year, 45 (22.4%) four-year, and 50 (24.9%) fifth-year students (in Colombia, the majority of engineering majors require five years to complete a degree).

Procedure

The Chinese participants completed a paper-and-pencil questionnaire in class and the Colombian students completed an online questionnaire outside of class time. The questionnaires administered in both countries were similar in that they both included items related to the instruments described in the

next section and items assessing their demographic information (e.g., class standing, gender). Participants in both countries were asked to list a course they were currently enrolled in and to answer the questionnaire items in response to that course. The Chinese students were asked to select a course different from the one in which they were completing the questionnaire unless they were not enrolled in any other courses. In the Chinese sample, the responses represented students' perceptions in relation to 34 different face-to-face courses. In the Spanish sample, the responses represented students' perceptions in relation to 70 different face-to-face courses.

Instruments

MUSIC® Model of Academic Motivation Inventory (College Student version). The MUSIC Inventory (College Student version) consists of 26 items that are divided into five scales: a five item empowerment scale, a five item usefulness scale, a four item success scale, a six item interest scale, and a six item caring scale (Jones, 2012). Students respond to the scale items by choosing one of six options on a Likert-format scale: 1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Somewhat disagree*, 4 = *Somewhat agree*, 5 = *Agree*, 6 = *Strongly agree*. The items in each scale are averaged to create a mean scale score. For example, the five empowerment items are averaged to create a mean scale score for empowerment. The MUSIC Inventory has been shown to produce reliable and valid scores and to correlate with other measures as expected (Jones & Skaggs, 2016). The complete inventory is available at Jones (2012). Example items include the following: "I have flexibility in what I am allowed to do in this course" (empowerment), "In general, the coursework is useful to me" (usefulness), "I am confident that I can succeed in the coursework" (success), "The coursework is interesting to me" (interest), and "The instructor cares about how well I do in this course" (caring).

In this study, the College Student version of the MUSIC Inventory (Jones, 2012) was translated into Chinese and Spanish. For both languages, the MUSIC Inventory was translated by an individual whose native language was the target language and who was enrolled in a doctoral degree program in a U.S. university at the time of the translation. The Chinese translator had

worked as a professor at a university in China for 16 years and the Spanish translator had worked as a professor at a university in Colombia for 13 years. The original translations were then translated back into English (back-translated) by other individuals whose native language was the target language (Villagran & Lucke, 2005). The individuals who conducted the back-translations had not seen the original English version of the MUSIC Inventory. The back-translations were then compared by an individual whose native language was English, who had worked as a professor at U.S. universities for 18 years, and who was familiar with the constructs in the MUSIC model and MUSIC Inventory. The native English speaker found only a few discrepancies in the back-translation and worked with the translator and back-translator to resolve the issues until the inventory items were deemed to be acceptable by the English speaker and the translator.

Behavioral engagement. For the Chinese sample, we used the same 4-item measure of effort used by Jones (2010) that was based on the 5-item Effort/Importance scale that is part of the Intrinsic Motivation Inventory (Plant & Ryan, 1985). This scale assesses the amount of perceived effort that students put forth in a course. Although the other engagement scales in this study include a 5-point Likert-format scale, we used a 6-point Likert-format scale (1 = *Strongly disagree*, 2 = *Disagree*, 3 = *Somewhat disagree*, 4 = *Somewhat agree*, 5 = *Agree*, 6 = *Strongly agree*) for this measure because it had been validated in prior studies. An example item is: "I put a lot of effort into this course." In Jones (2010), the reliability estimates across multiple samples were good (α = .84, .84, .86, .84).

For the Spanish sample, we used the 8-item behavioral engagement scale that is part of the engagement scale developed by Wang, Fredricks, Ye, Hofkens, and Linn (2016). They defined behavioral engagement in terms of "involvement in academic and class-based activities, presence of positive conduct, and absence of disruptive behavior" (p. 2). All items included a 5-point Likert-format scale (1 = *Not at all like me*, 2 = *Not much like me*, 3 = *Somewhat like me*, 4 = *Mostly like me*, 5 = *Very much like me*). An example item is: "I complete my homework on time." In Wang et. al. (2016), the alpha reliability estimate for this scale was good (α = .81).

Cognitive engagement. For the Chinese sample, we used the 8-item Self-Regulated Strategy Use scale that is part of the Student Perceptions of

Classroom Knowledge-Building Scale (SPOCK; Shell & Husman, 2008; Shell et al., 2005). The Self-Regulated Strategy Use scale assesses the extent of students' behaviors and strategies associated with self-regulation, such as of planning, goal setting, monitoring, and evaluation of studying and learning. An example item is: "I try to determine the best approach for studying each assignment." Students responded on a 5-point Likert-type scale with descriptors at each point (1= *Almost never*, 2 = *Seldom*, 3 = *Sometimes*, 4 = *Often*, 5 = *Almost always*). Shell and Husman (2008) documented an acceptable reliability estimate ($\alpha = .81$).

For the Spanish sample we used the 8-item cognitive engagement scale that is part of the engagement scale developed by Wang et. al. (2016). They defined cognitive engagement as "self-regulated learning, using deep learning strategies, and exerting the necessary cognitive strategies for the comprehension of complex ideas" (p. 2). All items included a 5-point Likert-format scale (1 = *Not at all like me*, 2 = *Not much like me*, 3 = *Somewhat like me*, 4 = *Mostly like me*, 5 = *Very much like me*). An example item is: "I try to connect what I am learning to things I have learned before." In Wang et. al. (2016), the reliability estimate for this scale was $\alpha = .75$.

Analysis and Interpretation of Values

In this section, we discuss the analyses that we conducted to address our research question and to assess the psychometric properties of Chinese and Spanish translations of the College Student version of the MUSIC Inventory. First, we assessed the internal consistency reliability of both translations by calculating Cronbach's alpha values for all of the MUSIC Inventory scales using SPSS (version 23). We used the following criteria to judge the values (George & Mallery, 2003): greater than 0.9 was excellent, between 0.8 and 0.9 was good, between 0.7 and 0.8 was acceptable, between 0.6 and 0.7 was questionable, between 0.5 and 0.6 was poor, and below 0.5 was unacceptable.

Second, to examine how the items in the MUSIC Inventory fit the five-factor structure of the MUSIC model, we conducted confirmatory factor analyses (CFA) using LISREL (version 8.80). We used three fit indices to assess the results of the CFA: the Comparative Fit Index (CFI), the

Standardized Root Mean Square Residual (SRMR), and the Root Mean Square Error of Approximation (RMSEA). Although the CFI can range between 0 and 1, values closer to 1 indicate a better fit (values above .90 represent reasonable fit and above .95 represent good fit; Hu & Bentler, 1999). The SRMR also ranges from 0 and 1, but values closer to 0 indicate a better fit (less than .05 indicates good fit [Byrne, 2001] and less than .10 indicates reasonable fit [Kline, 2005]). Finally, the RMSEA can vary between 0 and 1 with values closer to 0 indicating better fit (values less than .08 indicate reasonable fit and values less than .05 indicate good fit; Browne & Cudeck, 1993; Byrne, 2001; Kline, 2005). We also examined the factor loadings for each item on the appropriate factor (e.g., the empowerment items should load adequately on the empowerment factor). We deemed factor loadings to be acceptable if they were greater than 0.32 (Tabachnick & Fidell, 1996).

Third, as evidence of predictive validity, we calculated Pearson's correlation coefficients using SPSS (version 23) to examine the relationships between the MUSIC Inventory components and behavioral and cognitive engagement. Given that increases in students' perceptions of the MUSIC model components should lead to greater engagement (Jones, 2009, 2015), we predicted that the MUSIC Inventory components would positively correlate with behavioral and cognitive engagement.

Results

To assess the reliability of each of the MUSIC Inventory scales, we calculated the Cronbach's alpha values shown in Table 1. The alpha values ranged from .82 to .95, indicating that the reliability of the scales was good to excellent (George & Mallery, 2003). As a means of comparison in Table 1, we also present the alpha values that were reported for the English version of the MUSIC Inventory in Jones and Skaggs (2016, p. 5).

Table 1
Cronbach's Alpha Values and Fit Indices

Inventory version	*n*	Cronbach's alpha values					CFI	SRMR	RMSEA
		M	U	S	I	C			
Chinese	300	.82	.89	.87	.93	.88	0.97	0.060	0.089
Spanish	201	.88	.93	.91	.95	.92	0.97	0.054	0.107
English[a]	338	.91	.96	.93	.95	.93	0.92	0.055	0.085

Note. CFI, RMSEA, and SRMR are values from CFAs that were conducted with all the items from the MUSIC Inventory (i.e., empowerment [M], usefulness [U], success [S], interest [I], and caring [C]) scales separately for the Chinese and Spanish translations.
[a]Values for the English version were reported in Jones and Skaggs (2016) and were not based on data collected in the present study.

The fit indices from the CFA results are also shown in Table 1, along with the values from the English version presented in Jones and Skaggs (2016, p. 5). For the Chinese and Spanish translations, the CFI values indicate a good fit (Hu & Bentler, 1999), the SRMR values indicate a reasonable fit (Kline, 2005), and the RMSEA values indicate a borderline reasonable fit (Browne & Cudeck, 1993; Byrne, 2001; Kline, 2005). The factor loadings from the CFAs (see Table 2) ranged from .60 to .91, indicating that the items loaded well on their intended factors (Tabachnick & Fidell, 1996).

Table 2

Standardized Factor Loadings from the CFAs

Item	Empowerment	Usefulness	Success	Interest	Caring
M1	.75, .72				
M2	.60, .74				
M3	.66, .81				
M4	.73, .75				
M5	.73, .83				
U1		.81, .88			
U2		.72, .86			
U3		.80, .86			
U4		.80, .84			
U5		.79, .81			
S1			.81, .85		
S2			.81, .88		
S3			.81, .87		
S4			.76, .82		
I1				.85, .82	
I2				.86, .87	
I3				.82, .91	
I4				.86, .90	
I5				.78, .89	
I6				.80, .86	
C1					.69, .78
C2					.80, .85
C3					.61, .84
C4					.75, .75
C5					.80, .85
C6					.80, .79

Note. The two numbers in each cell are the standardized coefficients from two different analyses. The first number represents the Chinese sample and the second number represents the Spanish sample.

To examine the predictive validity of the scores produced by the MUSIC Inventory, we correlated the MUSIC constructs with behavioral and cognitive engagement. The correlation coefficients ranged from .28 to .61, which indicated a moderate correlation between the MUSIC components and engagement (see Table 3). Note that the instruments used to measure engagement in the Chinese sample were different from the instruments used with the Spanish sample; thus, some of the variation in the correlations could be attributed to the differences in the measures.

Table 3

Pearson's Correlation Coefficients for the Study Constructs

Engagement	Empowerment	Usefulness	Success	Interest	Caring
Behavioral	.57, .41	.61, .40	.61, .37	.61, .43	.52, .28
Cognitive	.45, .40	.48, .38	.54, .36	.43, .40	.37, .31

Notes. $p \leq .001$ for all coefficients. The first number in each cell represents the Chinese sample and the second number represents the Spanish sample.

Discussion

The primary purpose of this study was to determine the extent to which Chinese and Spanish translations of the College Student version of the MUSIC Inventory demonstrated acceptable psychometric properties. To do so, we computed Cronbach's alpha values for each MUSIC Inventory scale, we calculated the fit indices and factor loadings using CFA, and we calculated correlation coefficients between the MUSIC Inventory scales and measures of engagement.

The Cronbach's alpha values were all found to be good or excellent, indicating that the translated scales were reliable for the use with the Chinese and Spanish samples. The alpha values for the Chinese sample were slightly lower than those in the Spanish sample, but not by much. The high alpha values that we documented indicate that individuals using the MUSIC Inventory could expect to obtain consistent scores from the inventory scales.

We conducted CFAs to examine how the items in the MUSIC Inventory fit the five-factor structure of the MUSIC model. Because no one test exists to assess the fit of data to a model, we examined three different fit indices and the item factor loadings to examine the fit of the data to the model. Using the criteria we established a priori (based on Browne & Cudeck, 1993; Byrne, 2001; Hu & Bentler, 1999; Kline, 2005), data from both the Chinese and Spanish translations of the MUSIC Inventory were a reasonable fit to the five-factor structure of the MUSIC model. The factor loadings were also much higher than our a priori criterion value of .32 (Tabachnick & Fidell, 1996), which provided further evidence that the data fit the five-factor structure of the MUSIC model.

We compared the alpha values and fit indices from the Chinese and Spanish translations to the English version presented by Jones and Skaggs (2016). Overall, the alpha values from the Chinese and Spanish samples were similar to the alpha values reported by Jones and Skaggs (2016) in an American sample (see Table 1). The values for the CFI, SRMR, and RMSEA were also similar to those reported for an American sample (Jones & Skaggs, 2016). The fact that the alpha values and fit indices were similar across undergraduate students from China, Colombia, and the US, is interesting for a couple reasons. First, the similarities across different cultures indicates that the Chinese and Spanish translations were done well and produce scores as valid as those produced by the English version. Because of this, we have documented that these translations demonstrate acceptable psychometric properties. Second, the similarities across different cultures provides evidence that the MUSIC model is generalizable to at least some undergraduate students in Chinese and Hispanic cultures. That is, students in these cultures can perceive the MUSIC model components differently in an instructional setting. This is evidenced by the fact that the MUSIC model components separated into distinct factors in our CFA. We expected this finding because the MUSIC model was developed based on research and theories that apply to humans, regardless of race or nationality. For example, the MUSIC model suggests that instructors should interest students in the class content because all humans have a need for arousal (Berlyne, 1960).

As further evidence of the validity of the scores produced by the translated MUSIC inventories, we documented that students' perceptions of the five MUSIC model components were moderately correlated with behavioral and cognitive engagement, as we had predicted. These findings are important for theoretical and practical reasons. Theoretically, Jones (2009, 2015) explained that when students have higher perceptions of each of the MUSIC model components, they are more likely to have greater motivation and higher levels of engagement. The findings from the present study provide further evidence for this assertion because all of the MUSIC components were moderately correlated with behavioral and cognitive engagement; thus, this study contributes to our understanding of the theoretical relationships among these constructs. Practically, the relationships between the MUSIC components and engagement are important because they indicate that professors may be able to use teaching strategies intentionally to increase students' perceptions of the MUSIC components, which may then increase their motivation and engagement in their courses. In fact, interventions designed to increase students' perceptions of one or more of the MUSIC model components have led to increases in students' motivation and engagement (for examples, see Brown, Smith, Thoman, Allen, & Muragishi, 2015; and Lazowski & Hulleman, 2016).

Limitations and Future Research

One of the limitations of this study is that the participants are not representative of all undergraduate students who speak Chinese or Spanish. Future research could survey a broader variety of students and majors. In addition, future studies could compare differences between students in countries that speak the same language. One possible question related to this point is: To what extent is the Spanish translation of the MUSIC Inventory valid for use with students in Spain? Although students in both Colombia and Spain speak Spanish, differences in dialect and culture may affect the scores produced on the Spanish translation of the MUSIC Inventory. Similarly, it would be useful to assess students in different regions of a country, such as in different regions of China.

Jones (2009, 2015) contends that the MUSIC model can be used for any type of instruction (e.g., lecture, problem-based learning, discussion). Therefore, in the present study, we did not compare the results across teaching approaches. By including a variety of teaching approaches in the present study, we assumed that the psychometric properties of the MUSIC Inventory were similar across teaching approaches, and therefore, that the findings could be generalized to all teaching approaches. In the future, researchers could examine whether the psychometric properties of the MUSIC Inventory vary across teaching approaches. For example, the inventory may prove to be more reliable for lecture classes than classes that employ problem-based learning approaches.

Implications and Conclusion

The Chinese and Spanish translations of the College Student version of the MUSIC Inventory demonstrate acceptable psychometric properties for use with undergraduate students. Therefore, instructors and researchers can use the inventories to assess students' perceptions of the five MUSIC model components. As described in greater detail elsewhere (Jones, 2009, 2015), instructors can use the results of the MUSIC Inventory to improve their instruction. For example, if students report low scores on the usefulness scale, instructors can consider strategies to help students understand the usefulness of the class material. Researchers can also use the inventories to assess students' perceptions of instruction, for example, after conducting an intervention. Or, to examine the relations between the MUSIC model components and other antecedents and consequences (e.g., Jones et al., 2015).

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