

## A SINGLE ITEM MEASURE FOR IDENTIFYING MUSICIAN AND NONMUSICIAN CATEGORIES BASED ON MEASURES OF MUSICAL SOPHISTICATION

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**MUSICIANS ARE TYPICALLY IDENTIFIED IN** research papers by some single item measure (SIM) that focuses on just one component of musicality, such as expertise. Recently, musical sophistication has emerged as a more comprehensive approach by incorporating various components using multiple question items. However, the practice of SIM continues. The aim of this paper was to investigate which SIM in musical sophistication indexes best estimates musical sophistication. The Ollen Musical Sophistication Index (OMSI) and the Goldsmiths Musical Sophistication Index (Gold-MSI) were analyzed. The OMSI musician rank item (“Which title best describes you?”) was observed to be the best SIM for predicting OMSI and Gold-MSI scores. Analysis of the OMSI item indicated three parsimonious musical identity categories (MIC); namely, no musical identity (NMI), musical identity (MI), and strong musical identity (SMI). Further analyses of MIC against common SIMs used in literature showed characteristic profiles. For example, MIC membership according to years of private lessons are: NMI is < 6 years; MI is 6–10 years; and SMI is > 10 years. The finding of the study is that the SIM of musician rank should be used because of its face validity, correlation with musical sophistication, and plausible demarcation into the three MIC levels.

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**I**N A RECENT REVIEW OF THE LITERATURE (Zhang, Susino, McPherson, & Schubert, 2018a), it was noted that the bulk of research investigating how musicians and nonmusicians differ uses responses to a single item measure, usually “how many years of music training have you had?” to determine who is and

who is not a musician. This practice is in stark contrast to views, but rare practice, that psychometric indexes have considerable advantages over single item measures. This paper presents an attempt to find a middle ground that encourages psychometrically satisfactory approaches but acknowledges that the practice of using single item measures is likely to continue. Given this likelihood, the paper investigates the statistical worth of currently used single item measures and proposes items that provide the most plausible estimates of the psychometric measures used to determine membership of the category “musician.” This crude and simplistic categorization is a necessary limitation used in studies interested in uncovering differences between the categories “musician” and “nonmusician.” Thus, we have used the terms musician and nonmusician in this light.

An interest in studying the distinctions between musicians and nonmusicians is conspicuously present in neurological, psychological, and medical science (Law & Zentner, 2012; McAuley, Henry, & Tuft, 2011; Müllensiefen, Gingras, Musil, & Stewart, 2014). However, methods used to understand the “musician” (frequently under the guise of “musically trained” or “trained musician”), usually in comparison to the “nonmusician,” are varied in the literature (Zhang et al., 2018a). The motivations behind these different approaches stem from competing arguments over how a musician should be defined and selecting efficient and conventional ways of collecting such data. The matter is further complicated because music researchers do not have at their disposal a clear, culturally delineated boundary between novice and professional as one finds in fields such as sport, medical practice, and education (Eraut, 1995). Because musical activity and engagement is so prevalent in Western (indeed most) cultures (Cross, 2006), it has become increasingly difficult to sustain a clear, straight-forward division between someone who is a musician and someone who is not. Identifying a musician, we will argue, comes through an ethereal picture that is on the one hand controversial and on the other dealt with in highly simplified treatments. The important and ambitious aim of defining a musician has received very little direct empirical enquiry.

### Three-Component Model and Single Item Measures

Recently, a *three-component model of the musician definition* (3CMMD) (Zhang et al., 2018a; Zhang, Susino, McPherson, & Schubert, 2018b) draws together the main approaches used to define the musician in music psychology literature. It is based on three broad components (Zhang et al., 2018b): (1) musician as defined by expertise; (2) musician as defined by their identity (usually self-identity); and (3) musician as defined by genetic predisposition or aptitude. Upon applying this model to survey how recent music psychologists have defined musicians, it was observed that a single item measure was used most regularly (Zhang et al., 2018a). For example, a musician was identified through either having: (a) musical expertise (i.e., usually involving some kind of music training) (Andrade, Vanzella, Andrade, & Schellenberg, 2017; Büdenbender & Kreutz, 2017; Taylor & Dewhurst, 2017); (b) a tertiary degree in music (Goodchild, Gingras, & McAdams, 2016; Proverbio & Orlandi, 2016; Rammsayer, Buttkus, & Altenmüller, 2012); (c) practiced a certain number of hours a week (Büdenbender & Kreutz, 2016; Weijkamp & Sadakata, 2017); or (d) self-identified as a musician (Fiveash & Luck, 2016; Fiveash & Pammer, 2014). Combinations of assessment items and from different components were rarely used. Crucially, an implicit “6-year rule” was found, where a musician is defined as someone with at least 6 years of musical expertise (e.g., music training, formal music training, and music lessons) (Zhang et al., 2018a). This finding highlights a key methodological practice where single item measures are used as an estimate of a participant’s membership into the musician category (Zhang et al., 2018a). However, while the “6-year rule” supports the conventional understanding of a musician as someone who is skilled in playing an instrument, (Lamont, 2002; Levitin, 2012; O’Neill, 2002; Rickard & Chin, 2017), it can potentially be limited by the narrow scope of surveying a musician’s years of training alone (O’Neill, 2002).

### Advantages and Limitations of Psychometric Tests

A broader inclusion of the musician definition to include skills other than instrumental expertise has driven the development of a number of psychometric, perception, and ability-based tests (Boyle & Radocy, 1987; Chin, Coutinho, Scherer, & Rickard, 2018; Cogo-Moreira & Lamont, 2017; Gordon, 1989; Law & Zentner, 2012; Peretz, Champod Anne, & Hyde, 2006). As described

in Hallam and Prince’s (2003) multifaceted view of musicality, skills such as the ability to engage with and evaluate music, and being able to play and improvise music, should also be included as hallmarks of a musician. Musical sophistication is of particular interest as it is a term recently adopted to encompass the many facets described by Hallam and Prince. Most notably, the Ollen Musical Sophistication Index (OMSI) (Ollen, 2006) and the Goldsmiths Musical Sophistication Index (Gold-MSI) (Müllensiefen et al., 2014) collect data on musical skill, achievements, and musical inclinations. Through self-reported questionnaires, all three components of the 3CMMD can be found in the assessment of musical sophistication. Thus, musical sophistication indexes can be viewed as psychometric realizations of 3CMMD.

Ultimately, musical sophistication (and other terms like musical talent, aptitude, and potential) is a theoretical construct (Müllensiefen et al., 2014; Ollen, 2006). That is, the presence of musical sophistication cannot be measured directly, but from which indices can be used to estimate meaningful patterns related to the concept of interest (Ary, Jacobs, & Razavieh, 2002; Hair, Anderson, Tatham, & Black, 1998). As a result, a number of question items pose as potential indicators for estimating musical sophistication (Ollen, 2006). For example, Gold-MSI was developed from the idea of measuring common and skilled musical behavior in a Western population (Müllensiefen et al., 2014). These behaviors (e.g., listening to music or emotional responses to music) serve as potential indicators for measuring musical sophistication, where similar behaviors are grouped into factors (e.g., Active Engagement and Emotions). That is, a factor is a label used for a collection of questions that are indicative of one set of conceptually related aspects of several contained in the overall set of questions used. Similarly, OMSI was developed from observations of skilled musical behavior as validated by expert music educators (Ollen, 2006). These OMSI indicators (e.g., attending live music concerts and compositional ability) best estimated expert ratings of musical sophistication. For both Gold-MSI and OMSI, responses for each indicator can be calculated to give a musical sophistication score that allows differentiation based on psychometric performance. For example, the musician category is typically determined by an OMSI score of > 500 (Lahdelma & Eerola, 2016).

However, as Zhang et al. (2018a) has shown, in the wake of the conventional experimental practice where researchers continue to ask a single item measure, such as “years of music training” to determine membership of the musician category, psychometric tests appear to have limited value. This practice was also observed when both

indexes were available to researchers at the time. Indeed, single item measures can have some advantages over multiple item measures, which according to Fisher, Matthews, and Gibbons (2016) include minimizing burden on the respondent, reducing criterion contamination, and increasing face validity. Thus, there exists a dilemma in literature when seeking to compare musicians with nonmusicians. The various other methods these studies tend to adopt mean that they rarely collect sufficient data to make a comprehensive, psychometrically based estimate of musicality.

It would be of interest if the comprehensive nature of musical sophistication indexes could be directly compared and contrasted with current approaches that continue to employ a single item measure to categorize the musician. One way to do this is to see if there exists a particular question or indicator that would provide the best estimate of overall musical sophistication using correlation-based analyses. Our approach was to examine established methods of data collection on musical sophistication to see if the single item measure referring to “years of music training”—a prevalent approach used in literature—is the most appropriate to use for the category of musician.

### Aims

This paper addresses two broad aims: 1) to investigate which single item measure, if any, best estimates overall musical sophistication score; and 2) to evaluate how the best single item measure can inform other components of the 3CMMD.

### Method

#### PARTICIPANTS

One hundred and fifty-nine individuals ( $M = 20.8$  years,  $SD = 1.8$  years; range = 18–28 years; 99 females) participated in the survey in exchange for course credit. Forty-one participants were enrolled in a Bachelor of Music degree (or equivalent). An additional five participants also completed the survey but were eliminated from the data analyses due to typographical errors and/or incomplete responses to the survey.

Due to the claim made by Müllensiefen et al. (2014) where OMSI supposedly emphasizes instrumental expertise and practice, we decided to select players who had at least played an instrument in the last 12 months, or “instrumentally skilled” participants. Thus, the analysis in Part 1 of the results which compared OMSI and Gold-MSI scores, and the first section of Part 2 of the results only examined “instrumentally skilled” participants.

All participants were recruited from a course that was enrolled by a wide range of university students, including those in the upper level of a music degree. Ethics approval to conduct the research was provided by the University Human Research Ethics Committee, approval code HC13015.

#### MATERIALS

A survey was created using KeySurvey (<http://www.worldapp.com/surveys/overview.html>), consisting of the Ollen Musical Sophistication Index (OMSI), Goldsmiths Musical Sophistication Index (Gold-MSI; v.1.0), and demographic questions. OMSI was selected because of its current prevalence in music psychology literature, where it has been used to aid the categorization of musician and nonmusician participants (Bailes & Dean, 2012; Bishop, Bailes, & Dean, 2013, 2014; Lahdelma & Eerola, 2016). Gold-MSI was selected as it was developed to be a more comprehensive test than OMSI (Müllensiefen et al., 2014). The use of two different psychometric measures of the same concept helped to guard construct validity and method bias (Podsakoff, MacKenzie, & Podsakoff, 2011).

#### PROCEDURE

All participants were asked to complete the survey in their own time. OMSI scores were calculated online (<http://marcs-survey.uws.edu.au/OMSI/>). Gold-MSI scores were calculated using the Gold-MSI All Items Scoring Template v1.0 supplied online (<http://www.gold.ac.uk/music-mind-brain/gold-msi/download>). Participants that met the requirement of being “instrumentally skilled” then had their OMSI and Gold-MSI scores analyzed further. For data analysis, question six (“Have you ever enrolled in any music courses offered at college or university?” Ollen, 2006) and question seven (“(If Yes) How much college-level coursework in music have you completed? If more than one category applies, select your most recently completed level” Ollen, 2006) from the OMSI questionnaire were combined for simplicity. That is, any participant who answered “No” to question six was automatically given a score of zero; any participant who answered “Yes” to question six was scored from one to nine according to their response to question seven.

### Results and Discussion

#### PART I: DETERMINING WHICH SINGLE ITEM MEASURE BEST PREDICTS MUSICAL SOPHISTICATION

Multiple linear regression and partial correlations from “instrumentally skilled” participants were used to determine which OMSI and Gold-MSI single item measure

best predicted OMSI and/or Gold-MSI scores: 1) OMSI items were used to predict Gold-MSI score; 2) both OMSI and Gold-MSI items were used to predict Gold-MSI score; 3) Gold-MSI items were used to predict OMSI score; and 4) both Gold-MSI and OMSI items were used to predict OMSI score. To manage the possibility that the multiple predictor items in each regression model exhibited unacceptable amounts of multicollinearity (Belsley, 1991; O'Brien, 2007), the variance inflation factor (VIF) was calculated and assessed. We set the threshold of acceptable multicollinearity as assessed by VIF to 10 (Hair et al., 1998; O'Brien, 2007). VIF above 10 was interpreted as a high level of multicollinearity, making the prospect of using the offending variable as a predictor unreliable.

The OMSI musician rank single item measure ("Which title best describes you?" Ollen, 2006) was significant in two out of four regressions: 1) with OMSI and Gold-MSI items predicting OMSI score ( $\beta = .612$ ,  $p < .001$ ,  $VIF = 7.182$ ); and 2) OMSI items predicting Gold-MSI score ( $\beta = .580$ ,  $p < .001$ ,  $VIF = 3.542$ ). When all OMSI and Gold-MSI items were controlled, the partial correlation between OMSI musician rank and OMSI score was  $r = .52$ ,  $p < .001$ . When all OMSI items were controlled, the partial correlation between OMSI musician rank and Gold-MSI score was  $r = .46$ ,  $p < .001$ .

The OMSI college-level music tuition single item measure ("How much college-level coursework in music have you completed?" Ollen, 2006) was also significant in two out of four regressions: 1) with OMSI and Gold-MSI items predicting OMSI score ( $\beta = .467$ ,  $p = .002$ ,  $VIF = 6.050$ ); and 2) OMSI items predicting Gold-MSI score ( $\beta = -.258$ ,  $p = .030$ ,  $VIF = 3.169$ ). However, the OMSI musician rank was the best single item measure in predicting both OMSI and Gold-MSI scores. When all other OMSI and Gold-MSI items were controlled, the partial correlation between OMSI college-level music tuition and OMSI score was  $r = .45$ ,  $p = .002$ . When all OMSI items were controlled, the partial correlation between OMSI college-level music tuition and Gold-MSI score was  $r = -.24$ ,  $p = .03$ .

Other OMSI and Gold-MSI items were also significant in one out of four regressions. For OMSI and Gold-MSI items predicting OMSI score, the Gold-MSI item "I am able to identify what is special about a given musical piece" (Müllensiefen et al., 2014) was significant ( $\beta = -.252$ ,  $p = .038$ ,  $VIF = 4.354$ ). For Gold-MSI items predicting OMSI score, the Gold-MSI item "I have trouble recognizing a familiar song when played in a different way or by a different performer" (Müllensiefen et al., 2014) was significant ( $\beta = -.343$ ,  $p = .018$ ,  $VIF = 3.221$ ). For

OMSI items predicting Gold-MSI score, three OMSI items were significant (Ollen, 2006): 1) "How old are you today?" ( $\beta = -.153$ ,  $p = .047$ ,  $VIF = 1.319$ ); 2) "For how many years have you engaged in regular, daily practice of a musical instrument or singing?" ( $\beta = .205$ ,  $p = .038$ ,  $VIF = 2.201$ ); and 3) "Which option best describes your experience at composing music?" ( $\beta = .203$ ,  $p = .038$ ,  $VIF = 2.145$ ). The experience of composing music ranges from "never composed any music" to "have composed pieces that have been performed for a regional or national audience."

These results show that while Gold-MSI was developed to cover as many facets of musical sophistication as possible, only two items in Gold-MSI were strongly correlated to overall musical sophistication while exhibiting acceptable amounts of multicollinearity ( $VIF \leq 10$ ), namely 1) "I have trouble recognizing a familiar song when played in a different way or a different performer" from the "Perceptual Abilities" sub-factor; and 2) "I am able to identify what is special about a given musical piece" from the "Emotions" sub-factor. These two Gold-MSI items, which were significant, appear to be skills that can either be developed through music training and/or appear through musical talent. For example, the ability to identify something "special" about a piece can be taught through music theory or it can be a wordless feeling felt through some connection with music. Consequently, research that further explores aptitude or training-based skills are needed to better understand overall musical sophistication.

Overall, the emergence of OMSI's musician rank item as the best single item measure for musical sophistication (because of its high Beta value) suggests both the significance of the self-identity component in the 3CMMD, and a relationship between self-identity as a musician and resultant musical sophistication. Moreover, given that a Gold-MSI score is comprised of a large majority of self-reported assessments of aptitude-based items, the significance of OMSI's self-reported musician rank item in predicting Gold-MSI score suggests that the presence of aptitude skills can inform a musical identity. That is, the greater the musical predisposition, the greater the musical identity and vice versa.

In addition, the presence of OMSI's college-level music tuition item as the second-best single item measure for musical sophistication is of particular interest as it challenges the conventional understanding of years of formal music training as the primary indicator of musicianship (Rickard & Chin, 2017). Instead of Gold-MSI's "I have had formal training in music theory for \_ years" or "I have had \_ years of formal training on a musical instrument (including voice) during my lifetime" items being

TABLE 1. Summary of Mean Values for Each Single Item Measure of the Musical Identity Category (MIC): No Musical Identity (NMI), Musical Identity (MI), and Strong Musical Identity (SMI)

Single item measure	Musician Group	Mean	SD	n	Mean difference (Cohen's <i>d</i> )		
					NMI	MI	SMI
Years of Private Lessons	NMI	4.5	3.8	31		−3.4(0.8)**	−6.2(1.6)**
	MI	7.8	4.5	32	3.4(0.8)**		−2.8(0.7)**
	SMI	10.6	3.7	28	6.2(1.6)**	2.8(0.7)**	6
Years of Daily Practice	NMI	4.1	4.2	31		−2.7(0.7)*	−4.6(1.0)**
	MI	6.8	4.1	32	2.7(0.7)*		−1.9(0.4)
	SMI	8.7	4.6	28	4.6(1.0)*	1.9(0.4)	
College-level Music Tuition Score	NMI	0.5	1.3	31		−1.8(0.8)**	−5.4(4.0)**
	MI	2.2	2.9	32	1.8(0.8)**		−3.7(1.6)**
	SMI	5.9	1.4	28	5.4(4.0)**	3.7(1.6)**	
OMSI score	NMI	99.9	68.3	31		−306.6(1.5)**	−644.5(3.7)**
	MI	406.6	273.4	32	306.6(1.5)**		−337.9(1.3)**
	SMI	744.5	237.5	28	644.5(3.7)**	337.9(1.3)**	

\*  $p < .05$ , based on Tukey HSD post hoc test; \*\*  $p < .01$ , based on Tukey HSD post hoc test

significant (Mullensiefen et al., 2014), the dominance of “college-level music tuition” could introduce a new understanding to what constitutes formal music training. That is, while the term “formal music training” has been used to denote a number of formats such as music and instrumental lessons (Bishop et al., 2014; Mace, Wagoner, Teachout, & Hodges, 2012; Weijkamp & Sadakata, 2017), it may be better understood as a form of tertiary music education. Interestingly, this implies that like other professions such as medicine and law, the professional pathway in music typically involves a tertiary education.

#### PART II: DEVELOPMENT OF MUSICAL IDENTITY CATEGORY (MIC) AND INFLUENCE ON OTHER AND COMMON SINGLE ITEM MEASURES USED IN LITERATURE

*Instrumentally skilled participants.* Since musical sophistication encompasses the many facets of a musician, and given that a self-reported musician rank item was identified as the best single item measure for musical sophistication, it can be inferred that the self-identity component of the 3CMMD is feasible for determining the “musician” category. However, although self-identity has been used in the literature as a single item measure for determining the musician category, other single item measures such as “years of music training” and “number of practice hours a week” have been used more frequently (see Introduction). To investigate how the OMSI musician rank item can inform other single

item measures, the individual musician rank responses were analyzed and grouped according to face validity.

From the six musician ranks, namely “nonmusician,” “music-loving nonmusician,” “amateur musician,” “serious amateur musician,” “semi-professional musician,” and “professional musician,” three ordered levels of musical identities forming a “Musical Identity Category” (MIC) were observed. That is, 1) the “nonmusician” ranks formed the “No Musical Identity” (NMI) category; 2) the “amateur musician” ranks formed the “Musical Identity” (MI) category; and 3) the “semi-/professional musician” ranks formed the “Strong Musical Identity” (SMI) category.

Four one-way ANOVAs were conducted to investigate the relationship between MIC (independent variable) and the four key single item measures (dependent variables) found in OMSI that correlate to other and more commonly used single item measures used in the literature. That is, 1) music training has been identified as “years of private lessons” and “college-level music tuition”; 2) number of hours of practice a week has been identified as “years of daily practice”; 3) psychometric score has been identified as “OMSI score.” The results are summarized in Table 1.

Years of private lessons had a main effect on MIC,  $F(2, 88) = 17.55$ ,  $p < .001$ ,  $\eta^2 = 0.285$ . A Tukey HSD post hoc test revealed that all groups were statistically different from each other (see Table 1). Years of daily practice

had a main effect on MIC,  $F(2, 88) = 8.59, p < .001, \eta^2 = 0.163$ , and all except MI and SMI were significantly different from each other (Table 1). College-level music tuition had a main effect on MIC,  $F(2, 88) = 54.65, p < .001, \eta^2 = 0.554$ , and all MICs were significantly different (Table 1). Here, SMI had a mean corresponding to approximately 2 years of full-time coursework in a Bachelor of Music degree (or equivalent); MI had a mean corresponding to 1 or 2 non-major courses; and NMI had a mean corresponding to the category of not enrolled in any music courses. Moreover, OMSI score was predicted by MIC,  $F(2, 88) = 67.57, p < .001, \eta^2 = 0.606$ , and all MICs were significantly different. Here, SMI had a mean OMSI score of 745, which according to Ollen (2006) is considered as ‘more musically sophisticated’ ( $> 500$ ), whereas both MI and NMI had mean OMSI scores of 407 and 100, respectively, which are considered as ‘less musically sophisticated’ ( $< 500$ ).

*All participants.* To compare the difference in mean values between the initial study concerning those who have played an instrument in the past 12 months, or “instrumentally skilled,” with those who have not, the analysis was conducted where participants that fell outside the initial criterion were then included. As number of participants in each level of MIC was not equally distributed— $n(\text{NMI}) = 88, n(\text{MI}) = 42, n(\text{SMI}) = 29$ —Kruskal-Wallis tests were conducted. A summary of these results can be found in Table 2.

A Kruskal-Wallis test showed that there was a statistically significant difference in: 1) years of private lessons,  $H(2) = 61.53, p < .001$ ; 2) years of daily practice,  $H(2) = 56.13, p < .001$ ; 3) college-level music tuition,  $H(2) = 87.08, p < .001$ ; and 4) OMSI score,  $H(2) = 97.16, p < .001$ .

TABLE 2. Summary of Kruskal-Wallis Test for Musical Identity Category (MIC)

Single item measure	MIC	Mean rank score	Pair-wise comparison		
			NMI	MI	SMI
Years of Private Lessons	NMI	56.0		**	**
	MI	97.7			.008
	SMI	127.2			
Years of Daily Practice	NMI	56.4		**	**
	MI	102.1			.110
	SMI	119.6			
College-level Music Tuition Score	NMI	61.5		.011	**
	MI	79.5			**
	SMI	137.0			
OMSI score	NMI	49.3		**	**
	MI	103.9			.002
	MI	138.5			

\*\*  $p < .001$

In comparing the “instrumentally skilled” group with the “all participants” group, clear cut-off points (benchmarks) can be observed for all four single item measures, which is only very slightly influenced by the expansion of the participant sample (Figures 1–4). A summary of these cut-off points can be found in Table 3. In particular, “years of private lessons” (Figure 1), “college-level music tuition score” (Figure 3) and “OMSI score” (Figure 4) all showed significant differences between the three MICs.

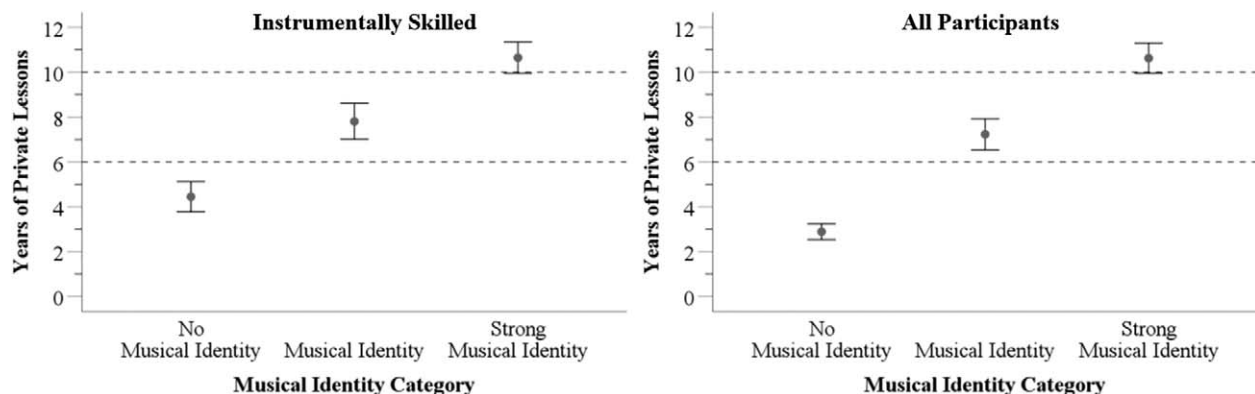


FIGURE 1. Plot of years of private lessons according to musical identity category (MIC) for instrumentally skilled participants (left) and all participants (right). Error bars indicate  $\pm 1$  standard error of the mean.

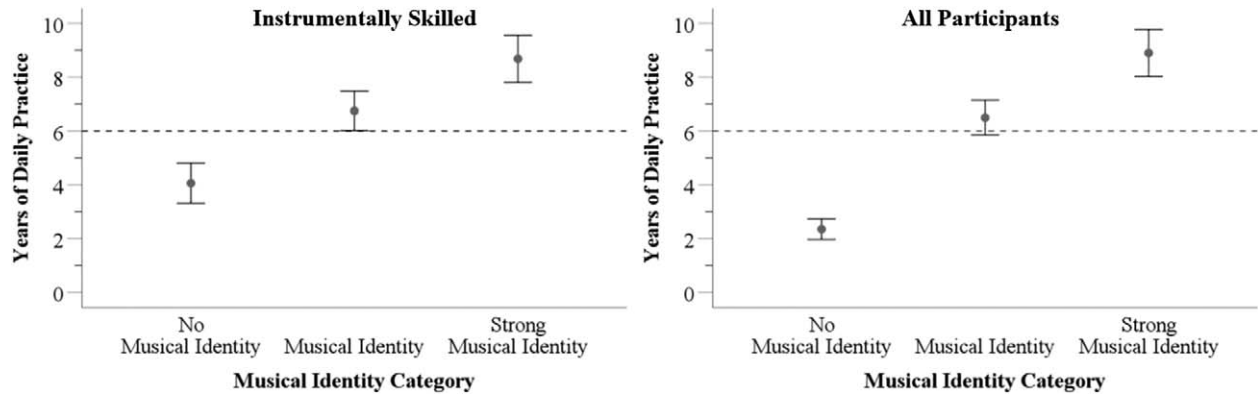


FIGURE 2. Plot of years of daily practice according to musical identity category (MIC) for instrumentally skilled participants (left) and all participants (right). Error bars indicate  $\pm 1$  standard error of the mean.

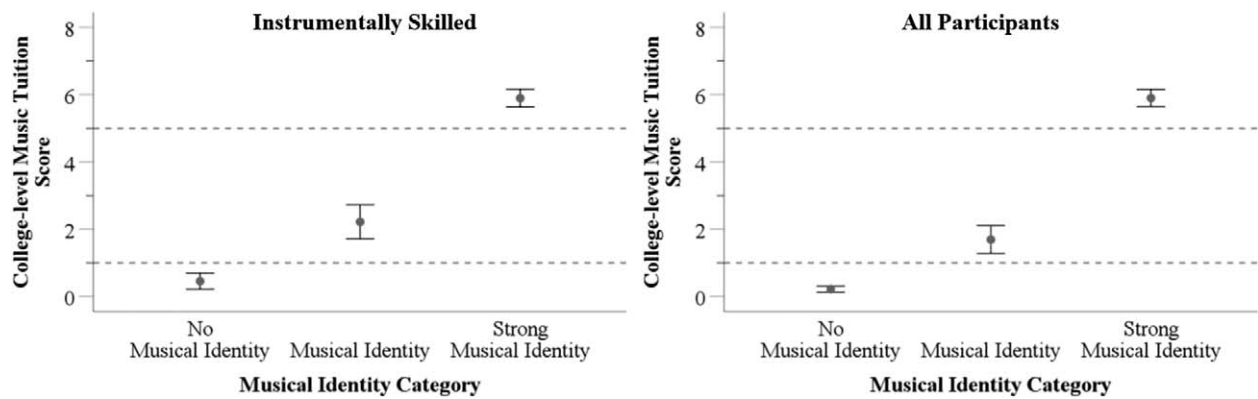


FIGURE 3. Plot of college-level music tuition score according to musical identity category (MIC) for instrumentally skilled participants (left) and all participants (right). Error bars indicate  $\pm 1$  standard error of the mean.

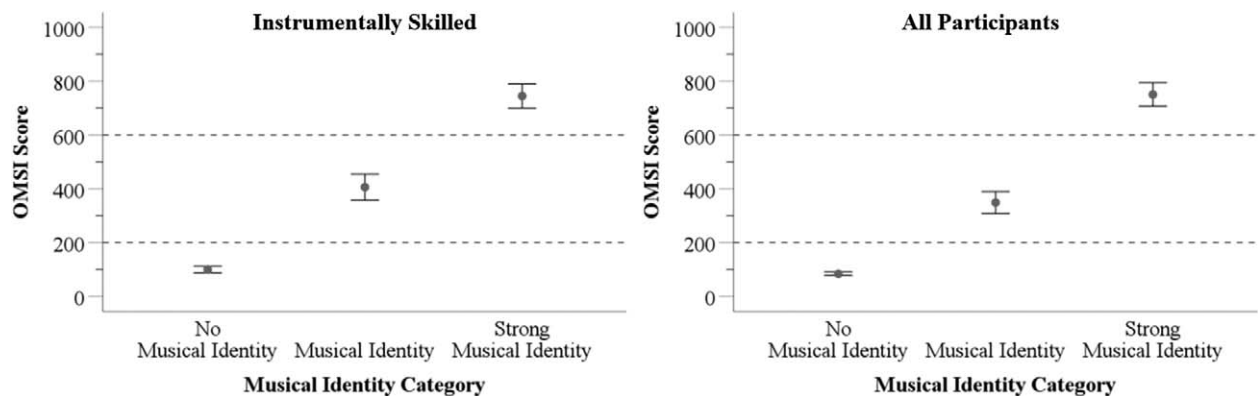


FIGURE 4. Plot of OMSI score according to musical identity category (MIC) for instrumentally skilled participants (left) and all participants (right). Error bars indicate  $\pm 1$  standard error of the mean.

TABLE 3. Summary of Musical Expertise Characteristics for Musical Identity Category (MIC)

Single item measure	No Musical Identity (NMI)	Musical Identity (MI)	Strong Musical Identity (SMI)
Self-identity rating	Nonmusician or Music-loving nonmusician	Amateur or Serious amateur musician	Semi-professional or Professional musician
Years of Private lessons	< 6 years	6-10 years	> 10 years
Years of Daily practice	< 6 years	> 6 years	> 6 years
College-level music tuition	Not enrolled in a college music course	At least enrolled in 1-2 non-major music courses	Enrolled in a Bachelor of Music Degree
OMSI score	< 200	200-600	> 600

The cut-off points were determined from the average of the upper and lower scores (within error) of NMI and MI or MI and SMI categories, respectively, for the “instrumentally skilled” group and then rounded to the nearest whole number to give a cut-off point that also aligns with the “all participants” group (Figures 1, 3, and 4). In addition, while there was no significant difference in “years of daily practice” between MI and SMI categories, a clear cut-off point was still observed between NMI and MI (Figure 2).

For all four single item measures, the mean values for the SMI category remained relatively stable. This was partly because only one SMI participant fell outside of the criterion of playing an instrument in the last 12 months. In contrast, 57 out of 88 NMI participants, and 10 out of 42 MI participants fell outside of the criterion. While it cannot be concluded that those with an SMI have skill in playing an instrument—which a musician is commonly perceived to have (Sloboda, 2005)—this result suggests that playing an instrument on a regular basis is integral to a strong musical identity. This is further supported by the fact that a small percentage of MI and a large majority of NMI participants did not fulfil the initial criterion.

A decrease in mean values can also be observed for both NMI and MI participants, when comparing the “instrumentally skilled” and “all participants” groups for the single item measures, “years of private lessons” and “years of daily practice” (Figures 1 and 2). The amount of decrease for both NMI and MI can be attributed to the number of participants that fell outside of the initial criterion. That is, a large majority (57 out of 88) of NMI participants, and a relatively small percentage (10 out of 42) of MI participants. These results are indicative of a close relationship between playing an instrument with private lessons and daily practice. That is, the action of playing an instrument is strongly correlated to participation in instrumental lessons and/or practice. Furthermore, the observation of a 6-year cut-off as the minimum level for MI (those who have self-identified

as “amateur musicians”) for both “years of private lessons” and “years of daily practice” items supports the current practice whereby music psychologists have implicitly categorized a “musician” as having at least 6 years of musical expertise (Zhang et al., 2018a). Similarly, a 10-year cut-off as the minimum level for “years of private lessons” for SMI resonates with the current cut-off used to identify “expert,” “highly trained,” or “professional” musicians (Zhang et al., 2018a). However, because the cut-off point for MI was determined from “instrumentally skilled” participants, researchers wanting to apply a more liberal categorization can use a cut-off of 4 years for both “years of private lessons” and “years of daily practice” as observed in the graphs for “all participants.”

In contrast, there is a much smaller decrease between the “instrumentally skilled” and “all participants” groups in both college-level music tuition and OMSI score items for all three MICs. This implies that a participant’s involvement in tertiary music education has little dependence on their state of instrumental practice. Instead, their self-identity is more strongly correlated to undertaking tertiary music courses. In addition, given the commonly used OMSI cut-off point where < 500 is less musically sophisticated and  $\geq 500$  is more musically sophisticated (Ollen, 2006), the observation of increasing OMSI scores from NMI to SMI supports the relationship between self-identity and musical sophistication, where an internal awareness of one’s musical self would facilitate the growth of other musical facets. The OMSI cut-off points are also in accord with the experimental values reported in the literature. For example, in Bishop et al. (2013), “expert” pianists had a mean OMSI score of 625, thus supporting our SMI cut-off (Table 3), while “intermediate” and “novice” pianists had OMSI scores of 462 and 319, respectively, thus supporting our MI cut-off (Table 3). Similarly, in Bishop et al. (2014), “expert” and “novice” performers or musicians had mean OMSI scores of 701 and 238, respectively. Moreover, in Bailes and Dean (2012), nonmusicians had a mean OMSI score of 136, thus supporting our NMI cut-off (Table 3).



## LIMITATIONS

The outcomes of this study are specifically related to the approach taken in music psychology research, and in particular, in connection with research on Western art music and Western musicians. Thus, any application towards other research areas or cultures where a “musician” may be studied or viewed differently, such as in musicology, ethnomusicology, or music education, are outside the scope of this investigation. In addition, following the dominant practice in music psychology literature where most “musicians” are recruited from tertiary institutions (Zhang et al., 2018a), participants of this study, mostly young adults (range = 18–28 years) were also recruited from a tertiary institution.

## Conclusions

A recent review of literature showed that music psychologists typically group musicians based on responses to a single item measure. Most commonly, a single item measure relating to some type of musical expertise, such as years of music training, is used. However, criticisms surrounding single component definitions for a musician argue for a more inclusive musician definition that recognizes facets other than musical expertise, such as aptitude and identity. As a result, musical sophistication has emerged to describe a multi-faceted view of a musician that is inclusive of musical skill, behavior, and ability. Yet, the tests that measure musical sophistication rely on capturing the multiple components thought to be related to the concept of musical sophistication, in contrast to the single item measures used in the bulk of research on musicians. While musical sophistication indexes are psychometrically more robust than single item measures, the present study was driven by the acknowledgement that researchers continue to use single item measures to assess membership of the category of musician. That is, we wanted to understand whether in those circumstances where a researcher uses a single item measure, such as years of music training, the item is optimally correlated with psychometrically robust measures of musician identification.

Two established tests—the Ollen Musical Sophistication Index (OMSI) and the Goldsmiths Musical Sophistication Index (Gold-MSI)—were applied. Interestingly, it was observed that the OMSI musician rank item, “Which title best describes you?” which is concerned with the individual’s self-assessed level of musical identity as opposed to an item relating to musical expertise was the best single item measure for estimating musical sophistication, predicting both OMSI and Gold-MSI scores. This implies that self-identity, as opposed to

musical expertise (the most conventional view of a musician) is a stronger indicator of what constitutes a musician. Individual self-reported OMSI musician ranks were then used to produce three distinct musical identity categories (MICs), namely: 1) no musical identity (NMI) for those who self-identify as nonmusicians; 2) musical identity (MI) for those who self-identify as, for example, amateur musicians; and 3) strong musical identity (SMI) for those who self-identify as semi-professional or professional musicians.

Further analysis of MIC against the other and more prevalent single item measures used in the literature—namely music training, practice, and overall musical sophistication score—revealed distinct characteristics and cut-off points (benchmarks) for each individual MIC level. Importantly, a 6-year cut off was observed for years of private lessons and years of daily practice as the minimum amount needed for an MI. This provides empirical support for the implicit “6-year rule” that is present in the literature where music psychologists have identified a musician as someone with at least 6 years of musical expertise (Zhang et al., 2018a), and a 10-year cut-off was identified as an indicator of membership of the SMI category. Thus, the three musical identity categories (as opposed to the typical dichotomy of musician vs. nonmusician) distinguishes between an “amateur” status of musician (MI), which has been used by music psychologists as the minimum requirement of being a musician, and the “semi-professional/professional” musician (SMI) status, which has a higher entry requirement. Overall, these characteristics and cut-off points provide strong evidence that the three components of the 3CMMD are well correlated with each other. That is, a high level of musical expertise indicates a strong musical identity and a high musical sophistication score.

These findings also have implications for research on the influence of musicianship upon psychological factors. Future studies on questions such as whether musicians differ from nonmusicians in intelligence (e.g., Schellenberg, 2004), empathy (e.g., Parsons et al., 2014), language abilities (e.g., Schön, Magne, & Besson, 2004) and so on, may benefit from including the new category of SMI that has been identified in the present study, in particular, comparing responses from SMI with MI and SMI with NMI. These categories have the additional advantage of further nuancing levels of musicianship, addressing in part the criticism of reducing levels of a highly complex construct of “musician” into a dichotomy. While the MIC trichotomy is an incremental improvement, our analysis suggests that it is a meaningful one.

Although musical sophistication indexes are generally the preferred and ideal way of assessing the

category of musician, the face validity and statistical coherence of a single item measure relating to musical identity provides a plausible and efficient alternative. This is important given that most music psychologists unequivocally categorize musicians using single item measures (Zhang et al., 2018a). Moreover, given the many ideologies surrounding how a musician should be defined, the characteristics reported for each MIC is intended to provide a more standardized criteria for the musician definition. That is, music psychologists can cross-reference a range of single item measures deemed most appropriate to their method of identifying a musician, while mitigating the ambiguity of determining how a musician group should be formed.

As such, MIC and its related characteristics will lead to future results being more easily compared and discussed, and pave the way for greater clarity but also flexibility in the current heterogeneous approaches to identifying a musician.

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