Verification and Validation of the Musical Self-Concept Inquiry (MUSCI) to Measure 'Musical Self-Concept' of German Students at Secondary Education Schools

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Abstract

Musical development can be very differently during adolescence and the mechanisms and reasons, which lead to these differences, are often objects of music educational research. To measure the aspects of musical development of German students, the psychometric construct 'musical self-concept' can be used. So the first aim of this study was to verify the factor structure of the initial MUSCI-questionnaire to measure 'musical self-concept' of German students. The second aim was to re-specify the underlying factor model as well as to validate the renewed sub-facets of the questionnaire with music-specific background variables (e. g. interest in 'music') as well as the construct 'musical sophistication'. Data of 516 students (f = 260, m = 251, missing = 5) from three Grammar (n = 382) and three Middle (n = 112) Schools as well as one Junior High School (n = 22) are presented. The data comprised self-assessed 'musical self-concept' and 'musical sophistication' as well as music-specific and demographic background variables. Data analyses included structural equation models (SEM), reliability measurement, and correlational analyses. The re-specified factor model shows a good fit (RMSEA = .040, $\chi 2/df$ = 1.808, TLI = .927 CFI = .941) as well as good subscale reliabilities (α = .635 to α = .799). In order to analyze concurrent validity, the relationships between the re-specified sub-facets of the MUSCI-questionnaire with 'musical sophistication' (r = .113 to r = .567) and music-specific variables (r = .112 to r = .489) were defined. The results demonstrate that the renewed version of the MUSCI-questionnaire can be used to measure 'musical self-concept' of German students.

Keywords: questionnaire survey, musical development, secondary education, musical self-concept,

music education

Introduction

Musical expertise, skills and behaviors can develop very differently during adolescence. The reasons and mechanisms behind these differences are often objects of research in music psychology and music education. It is generally assumed that the development of musical skills is integrated into the individual's overall development. Culture and the educational system as well as other things play an important role here (Gembris, 2013). In the past, musical skills as well as abilities, expertise, and competences either were measured with tests that quantify students' musical competences and achievements (e.g. Gordon, 1971), or were measured with aptitude and musicality tests that assess the student's potential for future musical achievement (Seashore, 1919; Bentley, 1968; Gordon, 1989). Furthermore, several longitudinal surveys have investigated the

(positive) influence of musical training on non-musical abilities and behaviors, such as intelligence, social behaviors, self-theories, and cognitive effects (e.g. Ho et al., 2003; Schellenberg, 2004). However, in music psychology (and sometimes in music education) studies, the measure of musical skills, expertise, and competence is often simply the participant's amount of instrumental musical training or extracurricular music education. Using such simplified measures neglects the complex and multi-faceted nature of musical expertise, skill, and related behaviour (Gembris, 2013; Hallam, 2010; 2006; Hallam & Prince, 2003). So in contrast, the developed *Musical Self-Concept Inquiry* (MUSCI) by Spychiger (2010, 2012; Spychiger & Hechler, 2014), with its broad conceptualization of *musical self-concept*, provides a much more suitable measurement tool. However, the MUSCI

questionnaire was originally developed for the use with adults, and has not yet been validated on younger children respectively on students in secondary education schools. So in this paper we are testing the assumption that the MUSCI questionnaire by Spychiger (2010) can be used with students at secondary education schools to evaluate the self-reported *musical self-concept* of musically non-active and active students[1].

Self-concept and musical self-concept

"The most general definition of self-concept is 'how one describes oneself' (Harter, 2003, p. 612)" (Spychiger, in press, p. 270). In line with Shavelson et al. (1976), "self-concept is a person's perception of himself. These perceptions are formed through his experience with his environment […] and are influenced especially by environmental reinforcements and significant others" (p. 411). So the "self-concept is inferred from a person's response to situations" (Shavelson, et al., 1976, p. 411). Following the seminal work by Shavelson, et al. (1976) the self-concept presents hierarchically ordered layers and a number of parts. "Layers, as well as their parts, are called *domains* of the self-concept. While the domains within a layer are similar with regard to their formal value, they distinctively differ from one another with regard to their content" (Spychiger, in press, p. 269). This means, that "the first layer distinguishes between the *academic* and the *non-academic* self-concept, and the second between their sub-domains" (Spychiger, in press, p. 269). With this in mind, *musical self-concept* is one part of a person's general self-concept (Spychiger, 2007, 2010). In addition, the term *musical self-concept* is hypothesized to be the psychological structure that turns personal musical experiences into musical identity. Connecting musical identity to musical self-concept sheds light on basic activities of the mind, awareness and consciousness, and on the interactive concept of recognition (Spychiger, in press). So "musical self-concept summarizes a person's answers to his or her inquiries into 'who-I-am' and 'what-I-can-do' questions with regards to music" (Spychiger, in press, p. 268). Above this, *musical self-*

concept includes different facets of ideas, perceptions, and assessments – the cognitions – a person has regarding its own musical activities (Bernecker et al., 2006, p. 53). Furthermore, self-concepts "are important factors in regulating a person's behavior and well-being. […] Self-concepts are the result of a person's self-perceptions, self-appraisals, self-representations, self-evaluations, and finally self-descriptions (Spychiger et al., 2009, p. 1). "If musical behaviour is a door to human consciousness, then individual differences in musical self-concept may shed light on the extent to which and the ways in which one makes use of this door[2], and how important these can be to someone" (Spychiger, in press, p. 283).

Previous Studies

In a multilevel process the construct of *musical self-concept* has been empirically operationalized (Spychiger, 2010) by using different German-speaking samples of adults. "Data were collected first by qualitative methods, interviewing about 70 participants of all social backgrounds, ages, and professional lives. Then, based on the results of content analyses, a questionnaire was gradually developed by quantitative methods" (Spychiger, in press, p. 272). The result of this operationalization process is the MUSCI questionnaire, with its empirically derived multidimensional factor structure, assessing many different elements of musical experiences and musical identity (Spychiger, 2010, Spychiger, in press). The statistical results of the three waves of investigation are 63 items that were selected using reliability and factor analyses. The final questionnaire was named MUSCI, the *Musical Self-Concept Inquiry* (Spychiger et al., 2009), and comprises 12 -subscales, of which 4 scales are to be completed by musicians (students who currently play a musical instrument) only. The MUSCI questionnaire, which is used in this study, to assess *musical self-concept* of musically non-active and active students,

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[1] Students who currently play or don't play on a musical instrument.

[2] "The metaphor of the door may be misleading: it is perhaps more appropriate to think that the 'different doors' are not distinct from one another, in terms of neural structures, perceptions, or actions, but rather that they are interrelated and combined in many ways, according to situational needs and possibilities" (Spychiger, in press, p. 283-284).

comprises the eight factors *Mood Management (S1)*, *Community (S2)*, *Technique & Information (S3)*, *Musical Ability (S4)*, *Movement & Dance (S5)*, *Spirituality (S6)*, *Ideal Music Self (S7)*, and *Adaptive Music Self (S8)* (with altogether 43 items) (Spychiger, in press).

Motivation for the application of the MUSCI questionnaire to students at secondary education schools

The operationalization of musical self-concept given by the MUSCI is very important for music educational research, because it provides a measuring tool that is able to represent musical experiences, and assess besides musical education also students' musical identity (Spychiger, in press). These factors generally have a considerable influence on the development of musical competence (e.g. Jordan et al., 2012), on the motivation and interest (Hoffmann et al., 1998, p. 65) e.g. in the school subject 'music' as well as on the development of musical skills, expertise and achievements (Fiedler & Müllensiefen, in press). The MUSCI can also contribute to research in music education and teaching by identifying relationships between adolescents' attitudes towards music lessons as well as its methodical orientation, and by developing models to investigate the influence of personal and socioeconomic variables on the educational music lessons and students' musical achievement (Heß, 2011a).

Aim of the study

The principal aim of this study is to test the MUSCI questionnaire (Spychiger, 2010; in press) developed to measure *musical self-concept* of the adult population, for the use with musically non-active and active students at secondary education schools. Therefore, the MUSCI shall be validated with a sufficiently large student sample. The MUSCI questionnaire, and its corresponding concept of *musical self-concept*, is proposed as an effective universal tool for music education research to evaluate musical experiences and identities (Spychiger, in press). Further aims of this study are to re-specify the underlying factor model as well as to validate the renewed sub-facets of the questionnaire against the Gold-MSI questionnaire (Fiedler &

Müllensiefen, 2015; Schaal et al., 2014; Müllensiefen et al., 2014), and to identify relationships between musical, demographic, and socioeconomic variables (e.g. *self-closeness to the school subject 'music'*, *interest in the school subject 'music'*, and *self-reported marks in 'music'*).

Methods

A. Sample

The sample consisted of 516 students (female = 260, male = 251, not specified = 5) from three Grammar (n = 382) and three Middle (n = 112) Schools as well as one Junior High School (n = 22) across different regions in the south-west of Germany. The average age was 12.78 years (SD = 1.82 years; not specified = 41) with an age range of 9 to 18 years. Concerning the age and types of school as well as teaching groups the sample shows no representativeness.

B. Data collection and measurement instruments

The complete questionnaire was distributed on paper and assessed *musical self-concept* with the MUSCI questionnaire (4-point Likert-scale), *musical sophistication* with the Gold-MSI (7-point Likert-scale), *self-closeness to 'music'*[3] (Kessels & Hannover, 2004; Heß, 2011b), *interest in the school subject 'music'* (Rakoczy et al., 2008), and *self-attribution concerning marks in 'music'* (Rakoczy et al., 2005, S. 164).

C. Data analyses

The data were analyzed using confirmatory factor analysis (CFA) to verify the factor structures of the initial MUSCI and to assess the Factor Reliability (FR) and Average Variance Extracted (AVE). Reliability measurements were employed to determine the internal validity (Cronbach's Alpha), correlational analyses to assess the criterion-related validity, and structural equation modeling (SEM) to re-specify the construct validity of the initial MUSCI questionnaire. Firstly, an analysis of empirically extreme values was conducted to identify outliers. All

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[3] Self-closeness is defined „as the extent to which a person uses an object or concept (like a school subject) in ordert o define his or her self (Kessels & Hannover, 2004, p. 130).

students (n = 533) with a tendency to only tick extreme values (one and seven or one and four) on the Gold-MSI as well as MUSCI questionnaire were identified using the inner-fences criterion (MUSCI ≥ 36, Gold-MSI ≥ 30) and were excluded from the data set (n = 17, 3.19 %). This left 516 students in the final dataset used for analysis.

Results

Table 1 outlines the means (M), standard deviations (SD), and ranges of the initial MUSCI scales derived from the students in the sample and documents the respective reliability coefficients plus the additional quality criteria Factor Reliability (FR) and Average Variance Extracted (AVE) (see Weiber & Mühlhaus, 2014) for each MUSCI dimension. The values of internal consistency (or reliability) for the eight initial MUSCI subscales to assess *musical self-concept* of musically non-active and active students generally ranged between α = .710 (α standardized = .710) and α = .844 (α standardized = .845). The exceptions were the subscales *Technique and Information (S3)* and *Spirituality (S6)*, with α = .584 (α standardized = .588) and α = .612 (α standardized = .615), only displaying a satisfactory reliability. All other subscales are within good to very good Cronbach's Alpha ranges. Moreover, the additional quality criteria FR and AVE achieve threshold values recommended in the literature (Bagozzi & Yi, 1988, S. 82; Fornell & Larcker, 1981, S. 46). The intercorrelation of the eight initial MUSCI subscales spanned from r = .123 to r = .496 (see table 2). The confirmatory factor analyses (CFA) of the structure of the initial MUSCI (Spychiger, 2010, 2012; Spychiger & Hechler, 2014) with the German student data set revealed only a satisfactory fit of data and model, with RMSEA = .054 and χ2/df = 2.52. Furthermore, the CFA showed with TLI = .805 and CFI = .829 also satisfactory incremental fit indices.

Table 1: Summary of the results of the reliability coefficients as well as the quality criteria (of the second generation) of the inital MUSCI subscales

Scale	n	M	SD	Min	Max	Cronbachs Alpha (standardized)	FR	AVE
Mood Management (S1)	515	3,08	0,61	1,17	4,00	.798 (.800)	.795	.397
Community (S2)	515	2,25	0,63	1,00	4,00	.635 (.635)	.638	.307
Technique & Information (S3)	514	2,55	0,63	1,00	4,00	.584 (.588)	.602	.286
Musical Ability (S4)	515	2,57	0,60	1,11	4,00	.844 (.845)	.841	.352
Movement & Dance (S5)	515	2,50	0,83	1,00	4,00	.824 (.823)	.827	.498
Spirituality (S6)	515	2,12	0,64	1,00	4,00	.612 (.615)	.637	.324
Ideal Music Self (S7)	515	2,56	0,69	1,00	4,00	.799 (.801)	.799	.447
Adaptive Music Self (S8)	513	2,62	0,69	1,00	4,00	.740 (.740)	.736	.412

Note: Measurements of the internal cosistency (Cronbach's Alpha) and the quality criteria of the second generation factor reliability (FR) and average variance extracted (AVE).

Table 2: Intercorrelations (Pearson) between the inital MUSCI subscales

Scale	S1	S2	S3	S4	S5	S6	S7	S8
S1 (Mood Management)	–	–	–	–	–	–	–	–
S2 (Community)	.463**	–	–	–	–	–	–	–
S3 (Technique & Information)	.229**	.440**	–	–	–	–	–	–
S4 (Musical Ability)	.322**	.529**	.462**	–	–	–	–	–
S5 (Dance & Movement)	.380**	.342**	.123**	.280**	–	–	–	–
S6 (Spirituality)	.342**	.404**	.245**	.260**	.236**	–	–	–
S7 (Ideal Music Self)	.337**	.496**	.633**	.468**	.266**	.279**	–	–
S8 (Adaptive Music Self)	.436**	.396**	.231**	.273**	.314**	.369**	.307**	–

Note: n = 516, **p ≤ .01 (2-tailed).

On the basis of this only satisfactory fit of data and model, the MUSCI factor structure was re-specified identifying the standardized residual covariance matrix and using AMOS modification indices. In order to re-specify the factor structure variables as well as factors, which do not excellently fit with data and model, were deleted. The factors *Technique & Information (S3)* and *Spirituality (S6)*, which already showed only an acceptable internal reliability (Cronbach's Alpha), were removed. Moreover, the factor *Movement & Dance (S5)* as well as several variables of the factor *Musical Ability (S4)* were also deleted in the re-specification process. The re-specified MUSCI questionnaire only includes the five factors *Mood Management (S1_new)* with six items, *Community (S2_new)* with four items, *Musical Ability (S3_new)* with five items, *Ideal Music Self (S4_new)* with five items, and *Adaptive Music Self (S5_new)* with four items (altogether 24 items). The re-specified factor model shows a considerably better fit to the data than the original MUSCI model (RMSEA = .040, χ2/df = 1.81, TLI = .927 CFI = .941) as well as good subscale reliabilities (α = .635 to α = .799). Moreover, table 3 outlines the means (M), standard deviations (SD), and ranges of the re-specified MUSCI scales derived from the students in the sample and documents the respective reliability coefficients plus the additional quality criteria Factor Reliability (FR) and Average Variance

Extracted (AVE) (Weiber & Mühlhaus, 2014) for each re-specified MUSCI dimension. Now, the values of internal consistency (or reliability) for the re-specified five MUSCI subscales generally ranged between α = .740 (α standardised = .740) and α = .799 (α standardised = .800). The exception was still the subscale *Community (S2_new)*, with α = .635 (α standardized = .635), only displaying a satisfactory reliability.

In order to analyse concurrent validity, the relationships between each single re-specified sub-facets of the MUSCI questionnaire with *musical sophistication* (Gold-MSI) were analysed. Table 4 shows Pearson correlations between the re-specified MUSCI subscales with the Gold-MSI factors, with significant correlations between $r = .113$ to $r = .567$. The moderate to strong correlations between various re-specified MUSCI factors with various Gold-MSI dimensions reveal concurrent validity. This means that dimensions, which show moderate to strong correlation coefficients, are measuring similar latent factors. For example, the MUSCI factor *Mood Management (S1_new)* strongly correlates with the Gold-MSI factors *Active Engagement with Music (F1)* as well as *Emotions (F5)*, because the underlying latent factors are measuring similar dimensions.

Table3: Summary of the results of the reliability coefficients as well as the quality criteria (of the second generation) of the re-specified MUSCI subscales

Scale	n	M	SD	Min	Max	Cronbach's Alpha (standardized)	FR	AVE	Number of items
Mood Management (S1_new)	515	3,08	0,61	1,17	4,00	.798 (.800)	.795	.397	6
Community (S2_new)	515	2,25	0,63	1,00	4,00	.635 (.635)	.638	.307	4
Musical Ability (S3_new)	515	2,49	0,67	1,00	4,00	.778 (.780)	.776	.415	5
Ideal Music Self (S4_new)	515	2,56	0,69	1,00	4,00	.799 (.801)	.799	.447	5
Adaptive Music Self (S5_new)	513	2,62	0,69	1,00	4,00	.740 (.740)	.736	.412	4

Note: Measurements of the internal consistency (Cronbach's Alpha) and the quality criteria of the second generation factor reliability (FR) and average variance extracted (AVE).

Table 4: Correlations (Pearson) between the re-specified MUSCI subscales with the Gold-MSI factors Active Engagement with Music (F1), Perceptual Abilities (F2), Musical Training (F3), Singing Abilities (F4), and Emotions (F5)

Scales	F1 (Active Engagement with Music)	F2 (Perceptual Abilities)	F3 (Musical Training)	F4 (Singing Abilities)	F5 (Emotions)
S1_new (Mood Management)	.525**	.334**	.113*	.338**	.567**
S2_new (Community)	.555**	.358**	.316**	.415**	.493**
S3_new (Musical Ability)	.442**	.497**	.546**	.529**	.348**
S4_new (Ideal Music Self)	.409**	.266**	.152**	.285**	.363**
S5_new (Adaptive Music Self)	.351**	.236**	-	.192**	.404**

Note: ** p ≤ .01 (2-tailed).

Additionally, table 5 demonstrates the concurrent validity (criterion validity) between the MUSCI dimensions with the various on self- and causal-attribution existing variables

interest in the school subject music (M1), self-closeness to the school subject music (M2), and self-assessed marks in the school subject music (M3). The correlations coefficients range from $r = .112$ to $r = .479$, whereas the correlation of the z-standardized total score of the variables *M1*, *M2*, and *M3* (latent variable "school subject music") are between $r = .236$ and $r = .557$.

Table 5: Correlations (Pearson) between the re-specified MUSCI subscales with the music-specific background variables interest in the school subject music (M1), self-closeness to the school subject music (M2), self-assessed marks in the school subject music (M3), and the z-standardized total score of the variables M1, M2, and M3 (latent variable "school subject music")

Scales	M1 (interest in the school subject music)	M2 (self-closeness to the school subject music)	M3 (self-assessed marks in the school subject music)	M4 (z-standardized total score of the variables M1, M2, and M3)
S1_new (Mood Management)	.452**	.225**	-	.292**
S2_new (Community)	.479**	.276**	.126**	.391**
S3_new (Musical Abilities)	.515**	.406**	.341**	.557**
S4_new (Ideal Music Self)	.468**	..365**	.112*	.414**
S5_new (Adaptive Music Self)	.293**	.152**	-	.236**

Note: ** p ≤ .01 (2-tailed).

Discussion

The primary aim of the present validation study was to use the initial MUSCI questionnaire by Spychiger (2010, Spychiger & Hechler, 2014) with students at secondary schools, and thereby to test the multifaceted construct of *musical self-concept* with a heterogeneous sample in a music-pedagogical context, assessing musical expertise and identities in students. The collected data partly confirm the underlying factor structure of the initial MUSCI questionnaire. Moreover, the satisfactory fit indices show that the structural equation models of the factors are partly similar to the adult sample analyzed by Spychiger (2010). In addition, the good reliabilities of the initial MUSCI dimensions – the exceptions were the subscales *Technique and Information (S3)* and *Spirituality (S6)*, with α = .584 (α standardized = .588) and α = .612 (α standardized = .615) - suggest that the initial MUSCI questionnaire (Spychiger, 2010) can at least partly be used with students. However, a CFA of the underlying factor structure of the initial MUSCI shows that the questionnaire benefits from a re-specification for the use with students at secondary education. A result of the re-specification process is a new version of the MUSCI questionnaire with altogether 24 items assessing the five MUSCI dimensions *Mood Management (S1_new), Community (S2_new), Musical Abilities (S3_new), Ideal Music Self*

(S4_new), and *Adaptive Music Self (F5_new)* of students at secondary education. Thus, the re-specified MUSCI questionnaire with its broad conceptualization of *musical self-concept* can therefore provide a standardized as well as tested measuring instrument for research in (German) music education that enables the measurement of musical experiences and identities on several different facets with different subscales.

Also, the concurrent validity between the re-specified MUSCI subscales and the captured music-specific and criterion-related background variables demonstrates that various relationships exist between the respective subscales of the re-specified MUSCI and the variables *interest in the school subject 'music' (M1)*, *self-closeness to the school subject 'music' (M2)*, and *self-assessed marks in the subject 'music'* (M3) as well as with the dimensions of *musical sophistication* (Gold-MSI) (see table 4 and 5). Particularly interesting are the significant strong correlations between the re-specified MUSCI subscale *Mood Management (S1_new)* with the Gold-MSI dimensions *Active Engagement with Music (F1)* and *Emotions (F5)*, between the re-specified MUSCI subscale *Community (S2_new)* with the Gold-MSI factor *Active Engagement with Music (F1)*, and between the MUSCI subscale *Musical Abilities (S3_new)* with the Gold-MSI dimensions *Perceptual Abilities (F2)*, *Musical Training (F3)*, and *Singing Abilities (F4)*. These correlations, as expected, show that there is accordance between the similar dimensions (latent factors) measured by MUSCI as well as Gold-MSI. In contrast, weaker correlations were found between the MUSCI factor *Ideal Music Self (S4_new)* and *Adaptive Music Self (S5_new)* with the Gold-MSI subscales *Active Engagement with Music (F1)* and *Emotions (F5)*.

Regarding the further concurrent validities between the re-specified MUSCI subscales and the gathered music-specific variables (see table 5), moderate to strong correlations were found as well. These reveal a relationship between the variables *interest in the school subject 'music' (M1)*, *self-closeness to the school subject 'music' (M2)* and *self-assessed marks in the school subject 'music' (M3)* as well as the z-standardized total score (latent variable *'school subject music') (M4)* with the

particular factors of *musical self-concept*. Along these lines the MUSCI concept includes the cognitive, motivational, volitional, spiritual, and social meanings (Spychiger, in press, p. 284), "which are relevant to a person's identity" (Spychiger, in press, p. 284). In addition, there is a connection between the MUSCI subscales and the *self-closeness to the school subject 'music' (M2)*. These correlations demonstrate that, as Fiedler and Müllensiefen (in press) already showed, the *self-closeness to the school subject 'music'* mediates the effect of the *musical self-concept* (see also Kessels & Hannover, 2004). Moreover, "several structural equation models indicate the relationships between the sub-facets of 'musical self-concept' and 'musical sophistication' with the variable interest in the school subject ['music'] as well as relationships with other music-specific and demographic background variables" (Fiedler & Müllensiefen, in press). So "measurements cannot explain the phenomenon, but can make researchers think and give them orientation in many kinds of designs and investigations" (Spychiger, in press, p. 284). With that future research in music education ought to examine the relationships between various variables further and trace the development of students' *musical self-concept* and related factors over the adolescent period.

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