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Singing Ability, Musical Self-Concept, and Future Music Participation

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Abstract

Research on adults who identify as "tone deaf" suggest that their poor musical self-concept is shaped by a view of themselves as nonsingers even when their perceptual skills and singing ability are not significantly worse than the general population. Many of these adults self-selected out of further participation as children but expressed regret as adults for lost opportunities. The purpose of this investigation was to explore the role of musical self-concept, attitude, and related variables in predicting students' decisions to participate in elective music instruction in junior high and whether those same variables were related to their assessed singing ability. Findings suggest that family music participation and positive attitudes toward music, particularly their view of themselves as musicians, can predict with 74% accuracy which students choose to continue in elective music. Musical self-concept was also a unique predictor of singing accuracy performance, suggesting a connection between students' actual singing ability and their view of themselves as musicians.

Keywords

singing accuracy, music participation, self-concept, family background, development

Participation in elective music instruction has long been a concern of music educators. Recent statistics suggest that approximately 34% of U.S. students participated in some

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kind of elective music instruction in secondary school (Elpus, 2014; Keiper, Sandene, Persky, & Kuang, 2009), declining to around 21% for ensemble participation of high school seniors (Elpus & Abril, 2011). Researchers have explored possible reasons for the relatively low level of participation in elective music, including sociocultural factors (Corenblum & Marshall, 1998; Elpus, 2014; Elpus & Abril, 2011; Kinney, 2008, 2010; Klinedinst, 1991; Siebenaler, 2008), family and peer influence (Clements, 2002; Sichivitsa, 2007; Siebenaler, 2006), attitudes toward music (Amundson, 2012; Clements, 2002; Hallam, 1998; Mizener, 1993; Sichivitsa, 2003; Siebenaler, 2008), and self-perceptions of musicality (Amundson, 2012; Austin, 1990; Clements, 2002; Klinedinst, 1991; Mizener, 1993; Sichivitsa, 2007; Siebenaler, 2006). In elementary music education, where music participation is mandatory, the majority of the activities are focused on singing, so children who feel that they do not sing well may assume that they aren't good at or don't "like" music.

Previous studies have reported that individuals who believe they are poor singers have been reluctant to participate in music activities (Abril, 2007; Knight, 1999; Whidden, 2010). Sloboda, Wise, and Peretz (2005) investigated the beliefs of self-identified "tone deaf" individuals and found that individuals who believed they were tone deaf were also likely to describe themselves as "unmusical" and reluctant to participate in any music activities. They also believed that their condition of tone deafness was permanent and limited the musical goals that they could accomplish. The researchers also noted that their participants' negative musical self-concepts were informed through social interactions. Many of the participants had normal music perceptual and singing abilities but believed that they were tone deaf because they were comparing their abilities to much stronger musical peers. It may be that self-described tone deaf singers are unsure if they sing badly or not and are reluctant to sing in the presence of others, fearing their self-perceptions of their singing ability reflects an actual lack of skill.

Many students who opt out of elective music may do so not because they lack interest but because of some self-perceived inadequacy as a musician. It is possible that negative self-perceptions about singing ability or "talent" are a significant factor in the documented low participation levels in elective music classes. It would be helpful for music teachers to know whether elementary students' attitudes about music and about themselves as musicians can predict whether or not they choose to continue in elective music and the extent to which such perceptions are rooted in real difficulties with singing.

Participation decisions often occur at transition points in a student's education such as elementary to middle school, middle school to high school, or high school to college. Siebenaler (2006) retrospectively surveyed high school choir and nonchoir students' musical background and attitudes and found that continued participation was related to positive support and parental involvement at home, positive music experiences in elementary school and middle school, a positive self-concept with regard to music skills, and the support of peers. Austin (1990) found that musical self-concept was the only significant predictor of the degree of music participation in elementary school. Studies of instrumental students (Corenblum & Marshall, 1998; Hallam, 1998; Klinedinst, 1991) found a similar influence of musical self-concept and peers and also

identified socioeconomic status and teacher ability ratings as important in students' continued participation.

In a 2002 study, Clements sought to identify what combination of variables would predict not just students' interest or continuation in music but their initial choice to participate in elective music instruction in the transition from elementary to junior high. She had 504 sixth graders complete a series of questionnaires that examined personality, sex roles, attitudes toward music, self-concept in music, cost of participation, peer influence, and perceptions of the junior high music program. To these variables, she added standardized test scores and the teacher's assessment of each student's singing ability and overall musical ability. After the students had registered for junior high classes, she employed a discriminant function analysis to determine which set of variables best discriminated between those who continued in music and those who did not. The four most influential variables for determining who continued in music were high musical self-concept, a positive attitude toward music, a greater positive impact of peer influence, and a lower perceived cost of participation. The four other significant predictors in her model were high vocal ability as rated by their music teacher, family musical background, higher than average feminine self-perception (Bem Sex Role Inventory), and high musical ability as rated by the music teacher. Her model correctly classified 59.7% of the sample's participation choices between choir, nonchoir music classes, or no music classes.

In summary, several variables have regularly emerged as influences on music participation. Musical self-concept appears frequently as a strong predictor of participation and often ahead of more objective assessments of students' musical ability. Influences of parents and peers either through support, engagement, or the student's perceptions of support seem to matter to students who continue. While socioeconomic level has been found to be significant in several studies regarding student retention in instrumental music (Corenblum & Marshall, 1998; Kinney, 2010; Klinedinst, 1991), it has not been consistently defined and did not seem to predict initial enrollment (Kinney, 2010). Teachers' ratings of student ability were also found to be predictors in several studies but less so than the students' self-perceptions or attitudes. Few of the studies cited measured students' musical achievement objectively, and none included a measure of students' singing ability, which is of primary interest to this investigation.

In an oft-cited study, Mizener (1993) looked at the attitudes of 542 elementary students in Grades 3 through 6 toward singing and how they differed by grade level, gender, prior experience, and singing skill, both self-perceived and assessed. She did not attempt to predict enrollment choices but did include an assessment of singing skill as a variable. Twenty-three percent of the total sample (n = 123) sang "Jingle Bells" twice from a given pitch and then sang a second song of their choice. This yielded three scores, a pitch matching score (presumably matching the initial E of "Jingle Bells"), melodic accuracy in the best performance of "Jingle Bells," and melodic accuracy in the song of their choice (both on a 7-point scale). The only significant relationship between singing accuracy and all other study variables was between grade level and melodic accuracy on "Jingle Bells," with fourth and fifth graders scoring higher than third and sixth graders. She also reported,

> The most surprising results of all were that no significant relationships were found between self-perception of singing skill and assessed singing skill or between liking to sing or wanting to sing in choir and assessed singing skill. Results indicated that students who thought they were good singers did not demonstrate significantly better singing skills than did the students who did not think they sang well. (p. 240)

Her findings suggest that students' attitudes toward singing and self-perceptions are not grounded in actual skill. It should be noted, however, that she provided no information regarding the type of analysis used to test the significance of the relationships or any mean scores regarding self-perceptions of singing skill for her singing sample and how they compared to the larger group.

In previous studies, researchers have explored the influence of family members, peers, attitudes, and musical self-concept on music participation decisions while others have explored connections between singing ability and musical self-concept. For this study, we wanted to connect a number of those variables in a single investigation looking first at the role of self-reported attitudes toward music and family musical background on eventual participation choices and then at connections between those same variables and actual singing skill as measured by singing accuracy under two conditions. In Study 1, we explored the combination of environmental and attitudinal variables that best predicted a student's choice of whether or not to continue in elective music instruction. We then compared, in Study 2, the singing ability of a random sample of students who chose elective music and those who did not.

Method: Study 1

Sample

The participants in Study 1 were sixth graders (mean age 12.16) drawn from five different elementary schools that all feed the same junior high school in a suburban district in the Pacific Northwest region of the United States. Forty-three percent of parents in the district were college educated, and household median income was $53,000 compared to a national average of $53,105 (DeNavas-Walt & Proctor, 2015). The five schools had a mean free and reduced-priced lunch rate of 27% (range, 15.5%–37.5%) compared to an average of 46.3% for the state of Washington, and on average, 54% of the children were White (range, 46.4%–67.8%) compared with a national average of 50.3% (National Center for Educational Statistics, 2013). In this particular district, elective music begins in Grade 7 (approximately age 13), so all participants were receiving general music instruction 2 days/week for 30 minutes. Students also began instrumental music instruction in Grade 5, which included receiving group lessons two times a week for 45 minutes during the school day in addition to their regular general music class. Parents of all of the sixth graders in the participating schools were informed that a survey would be conducted during music class time and given the option to have their child opt out, resulting in 328 students who participated, or 98% of the total sixth-grade population in the five schools. Of those 328, nine questionnaires were rejected for being largely incomplete, resulting in a usable sample of 319

surveys (49% female), or 95% of the total sixth-grade population. The study was conducted with the approval of and in accordance with the guidelines of the university institutional review board.

Procedure

Two questionnaires were administered to the participants during their normally scheduled music class time. A member of the research team was present to distribute and collect the questionnaires and answer any questions students had about the items. The questionnaire took approximately 20 minutes per class to complete. All survey data were collected prior to the students registering for their junior high (Grade 7) classes. After the students completed registration for the following year's classes, we were able to link their registration data to their survey data and remove the names, leaving only an anonymous participant number.

On the first questionnaire, students provided information about musical and family background, including questions about additional music training, family members involved in music, amount of music listening at home, and where and how often they sing as well as basic information about age and gender. The second questionnaire was adapted from an instrument developed by Clements (2002). The Music Participation Questionnaire was designed to measure students' attitudes and beliefs about music and music participation by asking them to rate statements on a 5-point Likert scale from *strongly disagree* to *strongly agree*. Clements's original questionnaire had 42 items divided into seven subscales, but we were interested in only the four subscales that were most reliable and shown to discriminate between participants and nonparticipants (Clements, 2002, pp. 83–84).[1] The 24 items on the questionnaire were slightly altered to fit our setting and represented four different constructs: Musical Self-Concept (6 items), Attitudes About Music and Singing (6 items), Peer Influence (6 items), and Cost of Participation (6 items). Musical Self-Concept statements (e.g., "People like to hear me sing") assessed how confident the students felt about themselves as musicians and singers. Attitude Toward Music and Singing items, such as "I enjoy listening to music," dealt with how much students reported enjoying music and singing activities. "Being in choir would help a person make new friends" is an item related to Peer Influence or how important peers were in decisions to continue in music. Cost of Participation statements related to whether students believed that musical participation would interfere with other pursuits, for example, "A person can play sports and have time to do music." The entire questionnaire is included in Appendix A (available at http://jrme.sagepub.com/supplemental).

Results: Study 1

Of the 319 students that completed the questionnaire, 51% registered for elective music in seventh grade. Of those 161 students (53% female) who chose to continue in music, 45% chose band, 32% chose orchestra, 21% chose choir, and 2% chose multiple music classes.

Table 1. Multiple Logistic Regression With Standard Predictor Entry for Music Participation.

	b	*SE*	e^{β}	Wald(1)	*p*
Intercept	0.21	0.18	1.23	1.34	.246
School 1	0.40	0.27	1.49	2.13	.144
School 2	0.20	0.27	1.23	0.58	.445
School 3	−0.28	0.26	0.76	1.12	.289
School 4	0.50	0.26	1.65	3.69	.055
Gender	0.11	0.15	1.12	0.55	.460
Piano study	0.28	0.16	1.32	3.21	.073
Instrumental study	0.00	0.17	1.00	0.00	.995
Family musical engagement	0.57	0.14	1.77	17.00	<.001**
Attitude toward music	−0.02	0.21	0.98	0.01	.918
Perceived cost	0.08	0.20	1.08	0.15	.695
Peer influence	0.40	0.19	1.49	4.41	.036*
Musical self-concept	0.50	0.21	1.65	5.78	.016*

Note: $N = 308$.
*$p < .05$. **$p < .01$.

We predicted that there would be significant differences in attitude and belief statements between students who registered for elective music and students who did not. Before analyzing differences between groups, we examined the internal consistency of the questions used to measure each construct of the Music Participation Questionnaire. All subscales were deemed to have high enough internal reliability to be treated as unified constructs (alpha levels for each of the subscales of the questionnaire are shown in Table S1, available at http://jrme.sagepub.com/supplemental). We used the four subscale means for our subsequent analyses.

Figure 1 illustrates the means and standard error by group for the four categories of the Music Participation Questionnaire. We tested our initial hypothesis by running *t* tests between music participants (MP) and nonparticipants (NP) on each of the four areas, Self-Concept, Attitude, Peer Influence, and Cost of Participation, using a Bonferroni correction for multiple comparisons to control for Type I error. Students who registered for a music class reported significantly higher means on all four subscales. They had significantly higher perceptions of musical self-concept than those who did not intend to participate, $t(317) = 6.26$, $p < .001$. They also reported significantly more favorable attitudes toward music, $t(317) = 4.61$, $p < .001$; were more likely to be influenced by peers in their participation choices, $t(317) = 4.61$, $p < .001$; and believed more strongly that music is not a barrier to other activities, $t(317) = 4.93$, $p < .001$.

To determine which combination of variables best predicted the music participation decisions of our sample, we included 12 variables of interest in a multiple logistic regression with standard predictor entry (see Table 1). To control for clustering effects between schools, the students' school was effect-coded into four variables, using one school as a reference group. Musical self-concept, attitudes toward music, cost as barrier, and peer

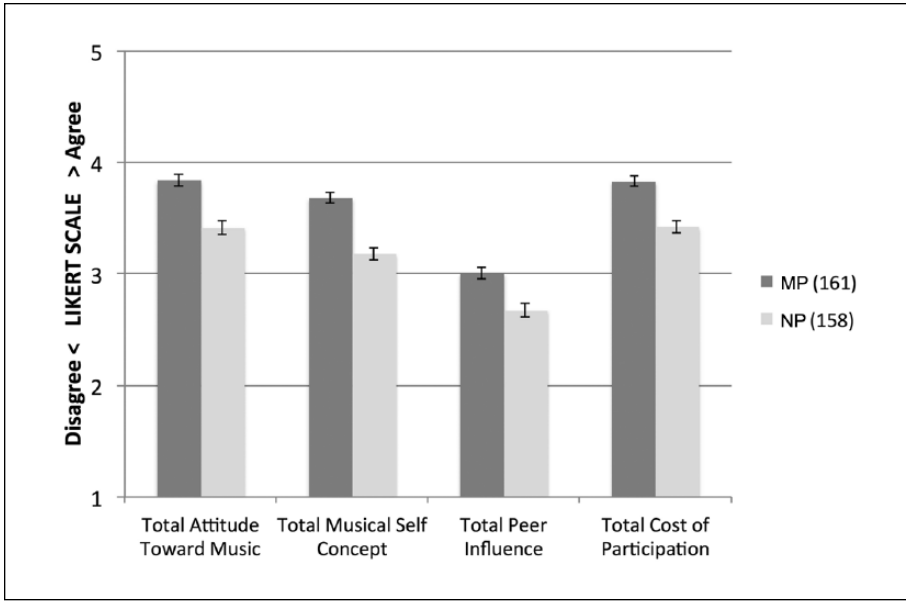

Figure 1. Comparisons Between Music Participants (MP) and Nonmusic Participants (NP)
Note: Error bars indicate standard error.

influence were each entered into the model as a metrical variable. Along with the four attitude variables, gender was entered in the model as a dichotomous control variable. Piano study, instrumental study, and family musical engagement were all coded as dichotomous variables and entered into the model. A test of the full model with the set of predictors against the null model with no predictors was significant, $\chi^2(12) = 80.86$, $p < .001$, indicating that the set of predictors reliably distinguished individuals who registered for elective music classes from those who did not. The approximate variance in registration status accounted for by the set of predictors was $r^2 = 0.31$ using Nagelkerke's formula. Model sensitivity was 72%, and specificity was 75%, with an overall hit rate of 74%, which was better than the null model's hit rate of 51%.

Only musical self-concept, peer influence, and family musical engagement were unique predictors of music participation decisions (Table 1). School affiliation, gender, piano study, instrumental study, attitudes about music, and perceived cost did not uniquely predict music participation. For a student whose reported combination of musical self-concept, peer influence, and family engagement in music was one standard deviation above mean, the predicted probability of music participation was 84%. Students who reported mean levels of musical self-concept and peer influence had a predicted probability of 55% to participate in music. Finally, the predicted probability for music participation for students who reported both musical self-concept and peer influence one standard deviation below mean as well as having no family involved in music was only 22%.

Method: Study 2

In Study 1, we explored the role of attitudinal and environmental variables in students' decisions to continue elective music instruction. We were also interested in whether students' musical environment and attitudes about music and about themselves as musicians were related to their assessed singing ability. Previous research with adults who are poor pitch singers indicated that their attitudes about themselves as musicians were strongly impacted by their difficulties with singing (Abril, 2007; Sloboda et al., 2005). The questions for Study 2 were (1) Is there a difference in singing skill between those who chose to continue music instruction and those who do not? and (2) Are any aspects of students' background or self-reported attitudes significantly related to their actual singing accuracy?

Our participants for Study 2 were sampled randomly from the Study 1 participants. We used nonproportional stratified sampling to include both those who were continuing music participation and those who were not. The 100-student sample yielded a total of 55 students (music participants = 32, 53% female; nonparticipants = 23, 30% female) who consented to have their singing accuracy tested.

Singing Measure

The singing task procedure was facilitated by a MATLAB protocol that presented the stimuli and recorded the participants' responses. In order to identify appropriate singing ranges, the participants would sing a comfortable pitch. Using Praat software, the pitch content of the response was displayed to the researcher in Hz along with an estimate of the nearest pitch category corresponding to the mean frequency estimation. If the chosen pitch seemed uncomfortable or strained to the researcher, other singing exercises were conducted until the researcher felt confidence in the participant's workable range. Based on this information, the researcher chose an appropriate register based on D4, A3, or F3 with the range of a fifth. All pitch stimuli were recorded by a female voice singing on the syllable *doo*. One sample of each target pitch was selected and edited for onset and adjusted for accuracy in such a way that it could be combined with the other pitches in any combination.

After a comfortable range was identified, the participant was asked to sing the familiar tune, "Happy Birthday," on a starting pitch of his or her choice. The measure then continued with echo singing tasks. For each task, participants heard four consecutive pitches presented at mm = 60 on the syllable *doo*, and then echoed back the whole sequence. All participants were presented with three different echo tasks: single pitch (where all four pitches were the same), intervals (the first two notes and last two notes were the same), and patterns (where all four pitches were different). After a brief familiarization with the echo procedure, all three tasks were presented in a randomized order for 18 total echo tasks, six of each type. After the echo tasks, the student was asked to sing "Happy Birthday" again.

The 18 echo singing tasks were scored acoustically using a procedure adapted from Pfordresher and Brown (2007). The F0 of each sung pitch was extracted from the

Table 2. Average Singing Performance by Participant Group.

		Echo Singing Tasks						
		Mean Deviation Score in Cents			Mean Proportion Correct			
In Music Next Year		Single Pitch	Interval	Pattern	Single Pitch	Interval	Pattern	Whole Song Accuracy Score
Yes (n = 32)	Mean	41.31	43.96	47.55	0.83	0.85	0.80	4.90
	SD	59.70	68.70	59.90	0.24	0.23	0.23	1.26
No (n = 23)	Mean	55.92	55.88	68.85	0.79	0.79	0.68	4.12[a]
	SD	67.07	82.32	70.00	0.28	0.27	0.31	1.40

[a]Only 22 of the 23 participants completed this task.

audio signal via autocorrelation and checked for octave errors. The difference between the sung frequency and the target frequency was represented as a cent deviation score for each pitch. This was used to calculate an average cent deviation score for the entire measure. Pitch deviation scores were further converted into acoustically derived percent correct scores by coding every pitch deviation outside a window of ±50 cents as an error (score of 0), with other sung pitches being coded as accurate (score of 1) and then dividing the number correct by the total number of pitches analyzed.[2]

Each of the two attempts at singing "Happy Birthday" from memory was scored on an 8-point scale developed by Wise and Sloboda (2008; see Figure S1 available at http://jrme.sagepub.com/supplemental) by two independent judges who were blind to the study group and order of attempt for each example. Interrater reliability for scoring the song task was $r = 0.91$, and the scores were averaged across attempts and judges to yield a single score.

Results: Study 2

Table 2 shows the mean deviation score, proportion correct, and mean rating for all the singing tasks by participant group. To answer Question 1 regarding differences in singing performance between those who chose to go on in music and those who did not, we performed t tests on the singing tasks by participant group. There was no significant difference in the singing accuracy of the two groups for either the echo singing tasks, $t(53) = 1.12$, $p = .266$, or the "Happy Birthday" task, $t(52) = 1.82$, $p = .075$.

To answer Question 2 regarding possible relationships between singing accuracy performance and the variables that influence participation choices, two multiple linear regression analyses with standard predictor entry were used to determine which variables might predict singing accuracy scores in echo and song-singing tasks, respectively. For both regression models, musical self-concept, peer influence, and family musical engagement were entered into the model as these variables were identified in the previous logistic regression as significant and unique predictors of music

Table 3. Multiple Linear Regression With Standard Predictor Entry for Echo Tasks and Song-Singing Task.

	R^2_{total}	$R^2_{adjusted}$	$F(3, 51)$	p	b	SE	t	p	sr^2
Percentage of correct pitches in echo tasks	0.27	0.23	6.22	.001**					
Intercept					0.18	0.17	1.10	.285	
Family musical engagement					0.02	0.03	0.55	.586	0.00
Peer influence					0.02	0.04	0.39	.700	0.00
Musical self-concept					0.16	0.05	3.42	.001**	0.17
Song-singing score	0.32	0.28	7.92	<.001**					
Intercept					1.28	0.83	1.54	.130	
Family musical engagement					−0.03	0.15	0.17	.867	0.00
Peer influence					−0.11	0.22	0.49	.624	0.00
Musical self-concept					1.05	0.24	4.41	<.001**	0.28

Note: $N = 54$.
*$p < .05$. **$p < .01$.

participation (see Table 3). For both echo singing and singing a familiar song from memory, musical self-concept was the only unique predictor of singing accuracy. Results indicate that every standard deviation increase in musical self-concept corresponds to a predicted increase of 16% in echo singing accuracy and 1.05 points in song-singing accuracy.

Discussion

In Study 1, we discovered a number of preexisting differences between sixth graders who registered for elective music in seventh grade and those who did not. Students who chose to continue elective music instruction after elementary school were significantly more positive about music and about themselves as musicians than were those students who did not choose to continue. They were also more likely to see music as something more positive for peer relationships and less likely to interfere with other pursuits. The importance of these variables is consistent with Clements's 2002 predictive study. When all 12 variables of interest were entered into a logistic regression to see which combination of variables best predicted group membership (participant vs. non), the model predicted with 74% accuracy which students in our sample chose to continue music participation. This suggests that identifying future music participants in elementary school may be possible by surveying elementary students' musical background and attitudes about music. The fact that these opinions were recorded prior to the students making their registration choices lends greater credence to their validity than data collected retrospectively from students who have already identified as ensemble members. The results support previous findings demonstrating how attitudes toward music, peer influences and family background (Amundson, 2012; Clements, 2002; Mizener, 1993; Sichivitsa, 2003; Siebenaler, 2006) might influence students' choices about continuing in music.

Because of our interest in singing as a possible influence on participation, one limitation of the study was that our survey questions were somewhat skewed toward singing-related activities while the majority of music participants in our sample chose instrumental music as their elective. Had the questions been more neutral as to type of musical engagement, the variables of attitude toward music and cost of participation may have had more influence, though participants and nonparticipants differed significantly in responses to all four variables. It is worth noting that in Clements's (2002) study those four constructs, worded in much the same way, also separated music participants of all types, instrumental and vocal, from nonparticipants. Future research might consider surveying the same attitudinal variables with questions that represent more balance of music-making activities and attitudes.

Musical self-concept, peer influence, and family musical engagement were found to be unique predictors of music participation. The importance of musical self-concept as a predictor echoes an earlier finding that students' view of themselves as musicians was a stronger predictor than the teacher's assessment of a student's vocal or musical ability (Clements, 2002). It should be noted that Clements (2002) found that attitude toward music, peer influence, and cost of participation were all more influential than family background. This may be a result of the way in which those questions were asked. Clements used six items related to family musical background, including questions like "Would your parents be proud if you joined choir?" and the reliability of this category was below her criterion alpha of .70. In our study, family engagement was simply defined as how many immediate family members participated in music-making of some kind. Although some have suggested connections between home environment and students' musical ability through the use of surveys and self-report (Brand, 1986; Persellin, 2006), it would be most useful to study the impact of home musical environment in a more active way, seeking real-time data about musical activities in the home over a period and their relationship to a variety of musical skills and attitudes.

The second study explored connections among the variables that predicted continued participation and actual singing performance. Though participants' scores were higher than nonparticipants' on every task, there were no significant differences in singing scores between the two groups. This would seem to support previous findings that perceived ability does not accurately reflect actual ability (Mizener, 1993). However, when the three variables that uniquely predicted music participation (self-concept, peer influence, and family musical engagement) were tested for their ability to predict singing performance, only musical self-concept was found to be a significant predictor. This suggests that there is a relationship between actual singing ability and musical self-concept, a relationship alluded to in investigations of poor pitch singing with adults (Abril, 2007; Sloboda et al., 2005; Whidden, 2010).

It is not surprising that children's singing skill may play a significant role in the development of their musical self-concept given the emphasis on singing activities in elementary general music curricula (Campbell & Scott-Kassner, 2013; Phillips & Doneski, 2012). If one's ability to sing on pitch plays a role in developing a positive view of oneself as a musician, then deficiencies in that skill could lead students to opt out of further music training. Given connections found between accurate singing and

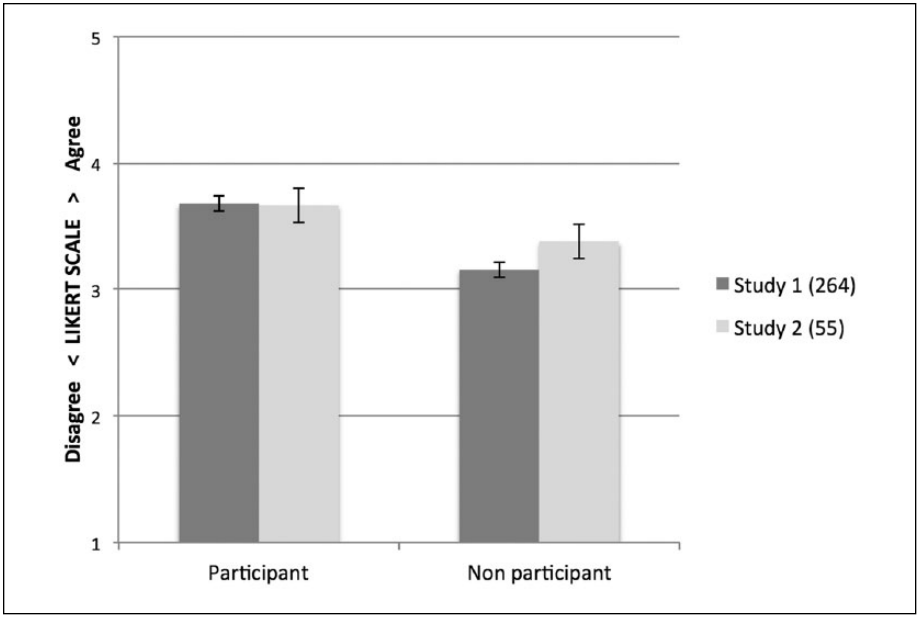

Figure 2. Self-Concept in Music Scores for Participants in Study 1 and Study 2.
Note: Error bars indicate standard error.

musical training (Demorest & Pfordresher, 2015; Welch et al., 2009), students who opt out of music would seem to be avoiding the very experience they would need in order to improve. Our understanding of this phenomenon would be enriched by research that explores the relationship between singing skill and music participation through the adolescent years once students can choose whether to participate. There is a distinct lack of research in both the educational and cognition literature on singing with adolescents (Loui, Demorest, Pfordresher, & Iyer, 2015). Both cross-sectional and longitudinal research on the impact of continued engagement in music on singing skills could clarify the extent to which singing "talent" is related to practice.

The relationship of musical self-concept to both participation decisions and singing accuracy highlights an apparent contradiction in our findings. If those who choose to continue music have a higher self-concept and a higher self-concept can predict who sings more accurately, then why were there not differences in singing performance between our participant groups? One possible explanation may be that our random sample for Study 2 was not sufficiently representative of the larger group from which they were drawn. Figure 2 shows the mean self-concept score for the Study 2 sample groups compared to the Study 1 groups from which they were drawn. The sample of 23 nonparticipants for the singing task had higher overall self-concept scores than did the nonparticipant population in Study 1, suggesting that they may not have been representative. A one-way analysis of variation on self-concept scores for the four sample

groups in the two studies found a main effect for group, $F(3, 315) = 13.21$, $p < .001$, but Scheffé post hoc tests revealed that while the Study 1 nonparticipants were significantly different in self-concept from both music participant samples, the Study 2 nonparticipants did not differ from either participant group on self-concept. This indicates the possibility of a selection bias, which can be a challenge for any study that attempts to compare singing skills in the general population. It is possible that nonparticipants with lower self-concept scores were not as willing to consent to participate in a study in which they were asked to sing.

Conclusion

Based on these results, students with a higher musical self-concept and with peers and family members engaged in music are more likely to choose to participate in elective music instruction. Music teachers in the elementary grades might consider surveying younger students about their musical self-concept and other attitudinal variables using some of the questions from this questionnaire to identify students who may be feeling less positive about their musicality. If caught early enough, perhaps teachers could provide opportunities for students to improve their self-perceptions of musicality.

Musical self-concept is an important predictor of both children's interest in future music participation and their singing ability. Music teachers need to know more about how their interactions with students could help or hinder the development of a positive music self-concept. If singing accuracy is instrumental in developing a child's musical self-concept, then it would be important for music teachers to provide more opportunities for students to practice this skill and experience success. However, narrative investigations of adults who self-identify as tone deaf suggest that music teachers are one of the culprits in students' development of a negative view of themselves as singers (Abril, 2007; Whidden, 2010). It may be that too much attention to a child's singing accuracy early on may actually hinder the development of a positive self-concept and therefore discourage further engagement in music. In a study that explored the implementation of a national singing curriculum in British primary schools, Welch and colleagues (2009) discovered that ironically, children's skills in singing improved as they aged even as their attitudes toward singing became more negative. Future research should explore both how and when children's musical self-concepts are formed and the relationship to both school and home environments. Are some elementary music activities more conducive to nurturing singing skills without threatening musical self-concept?

While self-concept was related to both participation choices and actual singing ability, nonparticipants were not significantly poorer singers, suggesting that the relationships between these variables are complex. If we as a profession are interested in expanding the number of children who choose to continue elective music instruction, we should continue to explore how singing skill and musical self-concept interact throughout a child's early development and what experiences might encourage improvement in both attributes.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Supplementary Material

The Appendix A, Figure S1, and Table S1 are available at http://jrme.sagepub.com/supplemental.

Notes

1. Clements (2002) also found family musical background to be a significant predictor, but we chose to explore musical background in a separate questionnaire.
2. In some cases, the audio quality of a response or a single pitch from a response was too poor to analyze acoustically, which is why scores were represented as a proportion of analyzed attempts.

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