ART AS A HUMANIZING AGENT

The 11th International Conference for Asia Pasific
Yogyakarta, Indonesia, August 18-19, 2023
e-ISSN 2985-4458 | p 14-21

Music and Social Skills: Empathy in Ensemble Musicians

Indra Kusuma Wardani[1]*, Ovan Bagus Jatmika[2], and Endang Ismudiyati[3]
[1,3]Music Education Department of Indonesia Institute of the Arts Yogyakarta
[2]Music Composition Department of Indonesia Institute of the Arts Yogyakarta

*Correspondence Author E-mail: indrakwardani@gmail.com

Abstract

Music and its related research have widely explored its utilization of humanization. One of its focuses and scope includes fostering social skills through musical activity and, vice versa, enhancing social skills to achieve better ensemble skills. This research aim is to explore the correlation between cognitive empathy and cognitive motor skills in ensemble musicians through a quantitative survey. By employing 56 ensemble musicians, the correlation analysis showed a low correlation between cognitive empathy and cognitive motor skills in ensemble musicians (r=.302, p=.003). Further, a regression analysis by adding the years of experience as one of its predictors showed a better correlation of this predictor as it explains more variance (R^2=28.2%) in cognitive motor skills compared to cognitive empathy as the main predictor (R^2=15.3%).

Keywords
empathy, ensemble skills, cognitive motor skills

Introduction

Over the decades, various research has been examining the utilization of music to foster social skills. Rabinowitch et al. (2013) showed the effect of long-term musical group interaction on empathic ability in children by implementing and examining empathy-promoting musical components (EPMCs) such as motor resonance, imitation, and entrainment. In another study, Rabinowitch et al. (2015) emphasize how music may promote empathy in individuals more than the type of music used to intervene in these skills. In their study, the active participation of music, especially the one employing interaction, has more potential to promote empathy in individuals.

To talk about empathy is a matter of a hundred years of evolution in humanity. The neuroscience of empathy considers this skill as a form of human evolution, as indicated by the existence of mirror neurons in some animals, such as primates and humans [3]. These neurons allow humans to imitate and internalize their surroundings into a particular cognitive process. Imitation ability in humans is the first step of empathizing, according to Hoffman when he explained the five modes of empathy [4] under the concept of *mimicry* with its four subsequent modes: conditioning, direct association, verbally-mediated association, and perspective-taking. These studies emphasized the existence of empathy as a biological predisposition of evolutionary results and a skill obtained through conscious and subconscious fostering.

Various studies mentioned the attribution of empathy in musical activity as an essential part of social and communication aspects [5], [6]. Wardani (2019) elaborated on the idea of empathy-like ability in musical activity by referring to the empathy mode of Hoffman and the vocal pedagogy of Gonzo [8] and by identifying the types of empathic abilities that occurred in the choir. The study

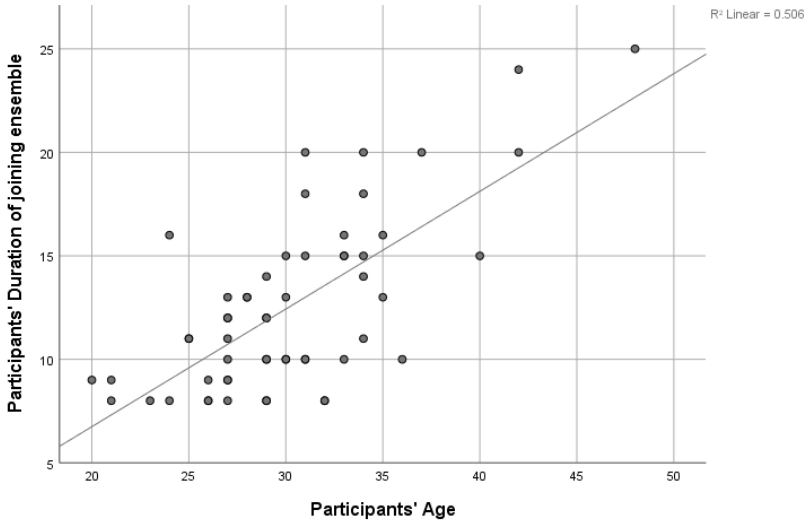
emphasized that empathic abilities manifested in musical and social action might have the potential to form the musical cohesion of the group. Another study by Wardani also explained that the missing empathic interaction tends to alter the overall sensation of the choir in the singers' perception [9], [10]. Thus, the importance of empathic abilities to achieve musical goals in a music group is inevitably both cognitively and socially.

The tendency of individuals in a musical group activity to synchronize their self-music-making with the other individuals does not only resonate with empathic ability but also with ensemble performance skills, as explained by Keller (2013). As musicians tend to perform mental imagery in every musical performance, the cognitive aspect may play a vital role. However, it will always be correlated to other musicians' mental imagery when it comes to ensemble playing. The core of cognitive-motor ensemble skills in Keller's study, namely Anticipation, Attention, and Adaptation, are always regarded as responses that are reciprocal to other individuals' actions. Meanwhile, the division of empathy into some categories, such as cognitive empathy, which is more into mentalizing, and affective empathy, which tends to involve affection and interactions, tend to be linear with the categorization and characteristics of ensemble performance skills. Thus, this study examines the relationship between cognitive empathy abilities and the cognitive-motor ensemble skills in musicians. The two variables have their dimensions and mentioned respectively: Online Simulation and Perspective Taking for Cognitive Empathy and Anticipation, Attention, and Adaptation for Cognitive-Motor Skill. The extension of this study is to examine the correlation between the variable's dimensions and another variable.

Methods

Participants

The participants of this study are 41 male and 15 female (N=56) musicians with more than eight years of ensemble experience. The average ensemble experience of the participants is 12.55 ± 4.23 years. The participants ranged from 20 to 48 years old (Mean=30.21 ± 5.294). The participant's age and years of ensemble experience can be seen in the following plot:



Materials

The *Bahasa Indonesia* translation of the Cognitive Empathy dimension of the Questionnaire of Cognitive and Affective Empathy (QCAE) is used to measure the cognitive empathy of participants [12]. The questionnaire consisted of 16 items with statements such as *'I can see if someone wants to be involved in a conversation'* on a 4-Likert scale. The participants will rate their agreement to the statements by choosing *1=totally disagree* up to *4=totally agree*. The validity test of the questionnaire through the bivariate correlation of total items and each item in this questionnaire showed all *r> .261* (critical value of df=55, α=.05). The reliability test of the questionnaire showed Cronbach's Alpha α=.834 which is considered to be very good or have 83.4% reliability.

The cognitive-motor skill dimension of ensemble performance skills is measured by developing a questionnaire based on this variable's theoretical framework and operationalization, as explained in Keller (2013), by exploring the three main dimensions: Anticipation, attention, and adaptation. The questionnaire consisted of 13 items with statements such as *'I can predict the tempo of a song by observing the conductor's body sway'* on a 5-Likert scale. The participants will rate their agreement with the statements by choosing 1=totally disagree to *5=totally agree.* The validity test of the questionnaire through bivariate correlation of total items and each item in this questionnaire showed all *r> .261* (critical value of df=55, α=.05). The reliability test of the questionnaire showed Cronbach's Alpha α=.863 which is considered to be very good with 86.3% reliability.

Procedure

The data is obtained through an online survey where the questionnaire is shared with ensemble musicians. The questionnaire presentation used Google Forms, a familiar and easy-to-use app. The participants filled in the demographic questions, such as age, sex, experience in the ensemble, and the consent form. The order of the questionnaire is as follows: The *Bahasa Indonesia* translation of QCEA and the Cognitive Motor Skill items.

Data Analysis

The responses from Google Form were exported to a CSV file to be processed in the Statistical Package for Social Sciences v. 26.0.0.0 with alpha levels set to .05. The preliminary analysis is to eliminate the participants who do not meet the minimum requirements of eight years of ensemble experience. This preliminary data processing reduces the number from 88 to 56. The study examined and analyzed the data of the remaining 56 participants. Instrument validity was analyzed through the bivariate correlation of total items in a particular variable and all items measuring the variable. The KMO statistics and their significance are also obtained to test the sufficiency of the sample number. KMO statistics is = .698, p=.000 showed the sample number to be mediocre. A bivariate correlation of Cognitive Empathy score and Cognitive Motor Ensamble Skill is used to examine the relation between the two variables.

Result

Correlation of Cognitive Empathy and Cognitive-Motor Skill

The Pearson correlation test of Cognitive-Motor Skill and Cognitive Empathy is statistically significant (p=.003) at the 0.01 significance level with r= .392. The further correlations of Cognitive Empathy's dimensions and Cognitive-Motor Skills are shown in the table below, which showed only the Online Simulation dimension significantly correlated with Cognitive-Motor Skills.

The 11th International Conference for Asia Pasific
Yogyakarta, Indonesia, August 18-19, 2023
e-ISSN 2985-4458 | p 14-21

Table 1 Correlation of Cognitive Empathy Dimensions and Cognitive-Motor Skils

Correlations

Dimensions of Cognitive Empathy		Cognitive-Motor Skills
Online Simulation	Pearson Correlation	**.502**
	Sig. (2-tailed)	.000*
Perspective Taking	Pearson Correlation	.202
	Sig. (2-tailed)	.135

Meanwhile, the correlation between Cognitive-Motor Skills dimensions and Cognitive Empathy is shown in the subsequent table:

Table 2 Correlation of Cognitive-Motor Skills Dimensions and Cognitive Empathy

Correlations

Dimensions of Cognitive-Motor Skills		Cognitive Empathy
Anticipation	Pearson Correlation	**.349**
	Sig. (2-tailed)	.008*
Attention	Pearson Correlation	**.297**
	Sig. (2-tailed)	.026
Adaptation	Pearson Correlation	**.332**
	Sig. (2-tailed)	.012*

Further and detailed correlations of each variable's dimensions can be seen in the following table:

Table 3 Correlation of Cognitive Empathy Dimensions and Cognitive-Motor Skill Dimensions

Correlations

		Online Simulation	Perspective-Taking
Anticipation	Pearson Correlation	**.369**	**.226**
	Sig. (2-tailed)	.005*	.094
Attention	Pearson Correlation	**.461**	.106
	Sig. (2-tailed)	.000*	.438
Adaptation	Pearson Correlation	**.417**	.176
	Sig. (2-tailed)	·001*	.195

The correlations in the three previous tables showed Online Simulation as the dimensions of Cognitive Empathy that correlates more with Cognitive-Motor Skills. On the contrary, Perspective-Taking has no correlation with Cognitive-Motor Skills as a whole and is correlated with Anticipation at a low level, namely r=.226.

The linear regression model with the addition of years of experience

Due to the low correlation between Cognitive Empathy and Cognitive Motor Skills as pieces of ensemble performance skills, further analysis is done through linear regression to fit into the regression model of $y = a + b_1X_1 + b_2X_2$ by adding participants' duration of joining the ensemble as another predictor.

Model Summary[c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.392[a]	.153	.138	6.23761	.153	9.784	1	54	.003	
2	.531[b]	.282	.255	5.79864	.129	9.485	1	53	.003	1.735

a. Predictors: (Constant), CognitiveEmpathy

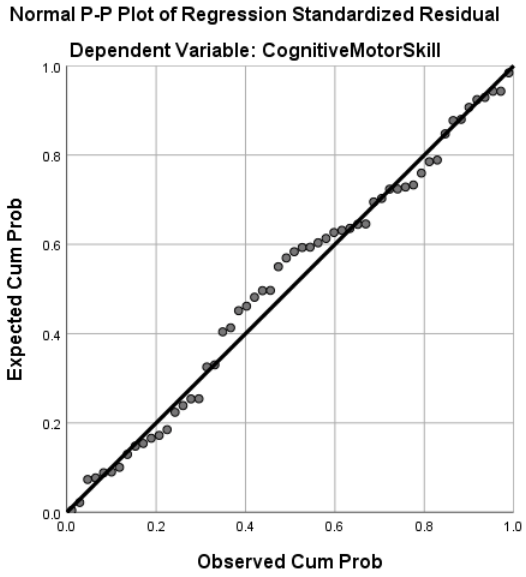
b. Predictors: (Constant), CognitiveEmpathy, Participants' Duration of joining ensemble

c. Dependent Variable: CognitiveMotorSkill

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95,0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	35.837	6.319		5.672	.000	23.169	48.505
	CognitiveEmpathy	.392	.125	.392	3.128	.003	.141	.643
2	(Constant)	30.366	6.137		4.948	.000	18.058	42.675
	CognitiveEmpathy	.358	.117	.357	3.057	.003	.123	.593
	Participants' Duration of joining ensemble	.572	.186	.360	3.080	.003	.199	.944

a. Dependent Variable: CognitiveMotorSkill



From the regression analysis, we can formulate the regression model of the variables as follows:

Cognitive Motor Skills = 30.366 + .358 (Cognitive Empathy) + .572 (Years of experience)

The regression analysis showed the correlation of Cognitive-Motor Skills with Cognitive Empathy with r=.392 and with years of experience with r=.531. In this model, years of ensemble experience accounts for a more significant percentage compared to Cognitive Empathy in explaining Cognitive Motor Skills, as it showed R^2= .282, which means it explains 28.2% of the variance in Cognitive Motor Skills. Meanwhile, Cognitive Empathy only accounts for 15.3% of the variance in Cognitive Motor Skills.

The 11th International Conference for Asia Pasific
Yogyakarta, Indonesia, August 18-19, 2023
e-ISSN 2985-4458 | p 14-21

Discussion

The relatively low correlation of Cognitive Empathy and Cognitive Motor Skills might be explained by some arguments. First, the two questionnaires used in this study might lack compatibility, especially in assessing the conceptualization of cognitive aspects in both variables. For example, the items to assess cognitive motor skills are more likely to sound like the conceptualization of mentalizing and simulation theory [13], [14] that is specified and contextualized into ensemble-related activity. Meanwhile, the cognitive empathy dimension of QCAE is more into the generalization of mentalizing that might be difficult for some individuals to assess self-perception. Still, in the evaluation of the questionnaire, the *Bahasa Indonesia* adaptation of QCAE cognitive dimensions might lack scrutiny validation due to the misuse of wording and sentencing. Another questionnaire developed in this study to measure Cognitive Motor Skills also needs to be examined due to its validity in measuring the required variable. The operationalization of the variable from the theoretical framework might need to be explored in more scrutinized ways for better measurement.

The data analysis showed Online Simulation's tendency to correlate more to Cognitive-Motor Skills than perspective-taking to Cognitive-Motor Skills. Reniers et al. (2011) explained in their study that Online Simulation requires more effort and attempts to put individuals in others' mental states by imagining what others think or feel. It differs from Perspective Taking, which is more involuntary and requires minimum mental effort to imagine others' mental state. The Online Simulation dimension is characteristics are more parallel with item type in Cognitive-Motor Skills that mostly require individuals to identify their ability to read others' mental states and execute non-verbal communication through specific gestural and mental imagination processes. Thus, the similar characteristics of Online Simulation and Cognitive-Motor Skills might explain this correlation tendency not generated in the perspective-taking dimension.
Another assumption in terms of methodology might placed in the sampling technique and the sufficiency of the sampling. Due to data collection limitations, the sampling used cannot be guaranteed to represent the population. Further, the KMO statistics .698 that lay in the mediocre level is also prone to lead to wrong data analysis, such as item elimination and weak score correlation. For all these methodologies' limitations, the analysis result might differ in a better methodology.

Despite all the methodologies and data-collecting limitations, the theoretical framework of this study might need to be explored. First, empathy as a skill is a holistic attribute of individuals. To only asses the cognitive dimensions might cause a lack of comprehension in individuals. The items that might complement each other might be unable to show due to the noninvolvement of certain aspects of empathy (namely, the affective aspect in QCAE). The cognitive motor skill as a part of ensemble performance skill in Keller [11], [15] is not only about how someone responds to certain stimuli but also how the individual reacts and does the mental imagery as the basis of the action. Thus, individuals might find this difficult to assess as their self-perception of mental imagery might differ from how they express it.

Moreover, the regression analysis showed a higher correlation and variance explanation in the equation, indicating the importance of Years of Experience in establishing Cognitive-Motor Skills. It also tells us about the importance of interpersonal interaction in musicians to read others' gestures and bodily expressions better and more accurately. The result of the linear regression can lead to the argument that cognitive-motor skills involving non-verbal communication and

musical processes, musical perception, and musical cognition require musicians to participate in an ensemble for a certain amount of time. It also provides a better explanation of why specific ensemble activity is less socially musical than others when interpersonal interaction is absent [9]

Conclusion

The notion of empathy as an essential skill in ensemble music might be true, yet the correlation of these two variables might depend on various factors. With the limitation of methodologies, especially the data collecting, the correlation between cognitive empathy and cognitive motor skills is relatively low. It might be better explained by the years of experience in joining ensemble musical activity.

Reference

[1] T. C. Rabinowitch, I. Cross, and P. Burnard, "Long-term musical group interaction has a positive influence on empathy in children," *Psychol. Music*, vol. 41, no. 4, pp. 484–498, 2013, doi: 10.1177/0305735612440609.

[2] T.-C. Rabinowitch, "How, Rather Than What Type of, Music Increases Empathy," *Empir. Musicol. Rev.*, vol. 10, no. 1–2, pp. 96–98, 2015, doi: 10.18061/emr.v10i1-2.4572.

[3] J. Decety, "The neuroevolution of empathy," *Ann. N. Y. Acad. Sci.*, vol. 1231, no. 1, pp. 35–45, 2011, doi: 10.1111/j.1749-6632.2011.06027.x.

[4] M. L. Hoffman, "Empathy and Prosocial Behavior," in *M. L. Haviland-Jones & L. Barrett (Eds.), Handbook of Emotions*, The Guilford Press, 2008, pp. 440–455.

[5] S. Kawase, "Associations among music majors' personality traits, empathy, and aptitude for ensemble performance," *Psychol. Music*, vol. 44, no. 2, pp. 293–302, 2016, doi: 10.1177/0305735614568697.

[6] E. Cho, "The relationship between small music ensemble experience and empathy skill: A survey study," *Psychol. Music*, vol. 49, no. 3, pp. 600–614, 2021, doi: 10.1177/0305735619887226.

[7] I. K. Wardani, "Korelasi Keterampilan Empatik dan Kohesi Musikal (Studi Kasus: PSM ISI Yogyakarta)," 2019.

[8] C. L. Gonzo, "1977 Gonzo- Metaphoric Behavior in Choral Conducting," *Choral J.*, vol. 17, no. 7, pp. 8–12, 1977.

[9] I. K. Wardani, "Virtual choir: To sing together, individually," *Int. J. Creat. Arts Stud.*, vol. 9, no. 2, pp. 105–116, 2022, doi: 10.24821/ijcas.v9i2.8226.

[10] I. K. Wardani, "Back to Basic: What is missing in the virtual choir as a practice?," in *The 10th International Conference for Asia Pacific Arts Studies: Art in the post-digital age*, 2022, no. 1, pp. 62–72.

[11] P. Keller, "Musical ensemble performance : A theoretical framework and empirical findings on interpersonal coordination," *Int. Symp. Perform. Sci.*, pp. 271–285, 2013.

[12] R. L. E. P. Reniers, R. Corcoran, R. Drake, N. M. Shryane, and B. A. Völlm, "The QCAE: A questionnaire of cognitive and affective empathy," *J. Pers. Assess.*, vol. 93, no. 1, pp. 84–95, 2011, doi: 10.1080/00223891.2010.528484.

[13] K. Shanton and A. Goldman, "Simulation theory," *Wiley Interdisciplinary Reviews: Cognitive Science*, vol. 1, no. 4. pp. 527–538, Jul. 2010, doi: 10.1002/wcs.33.

[14] D. Zahavi, "Empathy, embodiment and interpersonal understanding: From Lipps to Schutz," *Inquiry*, vol. 53, no. 3, pp. 285–306, 2010, doi: 10.1080/00201741003784663.

[15] P. E. Keller, "Mental imagery in music performance: Underlying mechanisms and potential benefits," *Ann. N. Y. Acad. Sci.*, vol. 1252, no. 1, pp. 206–213, 2012, doi: 10.1111/j.1749-6632.2011.06439.x.

The 11th International Conference for Asia Pasific
Yogyakarta, Indonesia, August 18-19, 2023
e-ISSN 2985-4458 | p 14-21

Biographies

Indra K. Wardani is currently a lecturer in the Music Education Department of ISI Yogyakarta. Her research interest ranging from social psychology of music, the cognitibe psychology as well as the basic neuroscience of music. As a choir conductor and chorister, she tends to examine and identify the interpersonal interaction in choir in the sense of music psychology.

Ovan was born in Madiun, Juli 3rd 1985. He's been lecturer in the music composition department since 2015 till today. His major interests are music theory and philosophy. On behalf of his daily activity as lecturer, right now he is also aware of aesthethic issues in musical experience for his PhD project.

Dra. Endang Ismudiati was born on January 22nd, 1961. She is lecturer in Music Department of ISI Yogyakarta since 1989. Her specialties are Solfegge, music theory, choir conducting, vocal, and piano. Her research field focused on choir teaching in various ages.