

Valerie Krupp & Johannes Hasselhorn

Musical Participation and Personality Development

An Exploratory Longitudinal Study on Causal Inferences Between Musical Participation and the Big Five Personality Domains

Teilhabe an Musikkultur und Persönlichkeitsentwicklung. Eine explorative Längsschnittstudie zu Zusammenhängen zwischen Teilhabe an Musikkultur und den Big-Five-Persönlichkeitsmerkmalen

Die Annahme, dass Teilhabe an Musikkultur die Persönlichkeitsentwicklung fördert, ist eine wichtige Legitimationsgrundlage für musikalische Bildungsangebote. Wir verwenden Daten aus der Studie „Musik und Persönlichkeit“ für eine explorative Studie und untersuchen die Beziehungen zwischen formaler und informeller Teilhabe an Musikkultur und den Big-Five-Persönlichkeitsdimensionen. Mithilfe von Random-Intercept-Cross-lagged-panel-Modellen (RI-CLP) können wir zeigen, dass die Big Five in unterschiedlichem Maße mit den beiden unterschiedlichen Dimensionen von Teilhabe interagieren. Hinsichtlich der Frage nach kausalen Zusammenhängen zeigt sich, dass nur Gewissenhaftigkeit durch Teilhabe in formalen Kontexten leicht beeinflusst wird, während dieser Einfluss für die anderen Big-Five-Dimensionen nicht beobachtet werden kann.

1. Introduction

In 2013, the German Council for Cultural Education (Rat für Kulturelle Bildung) published a study entitled *Everything Always Good. Myths of Arts Education*¹ (Rat für Kulturelle Bildung, 2013). This study examined central assumptions about cultural education and participation, which often remain unquestioned.

1 Original German title: Alles immer gut. Mythen kultureller Bildung. <https://www.stiftung-mercator.de/de/publikationen/alles-immer-gut-mythen-kultureller-bildung/>

Our paper focuses on the common assumption that musical participation positively contributes to the personality development of young people (Autorengruppe Bildungsberichterstattung, 2012, p. 197; Bamford, 2010, p. 173; Spychiger, 1992). This assumption can be found in a variety of policy documents (e.g., Bundesvereinigung Kulturelle Kinder- und Jugendbildung, 2011; Kultusministerkonferenz, 2022) and curricula (e. g. Ministerium für Bildung Rheinland-Pfalz, 2017, p. 3) and provides the basis for the financing of musical education projects by foundations and government. This assumption persists although research reports state that robust empirical, supporting evidence is hard to find and that longitudinal studies are needed to better understand the effects of cultural participation on personality development (Bamford, 2010; Gembris, 2015; Kröner, 2013).

We know that personality traits tend to stabilize over time. Particularly in children and young adults, even greater changes in personality traits can occur compared to adults. As children and young adults become more independent of their parents and educational institutions, they shape their environment according to their interests and personality (Asendorpf & Neyer, 2012, p. 272). This leads to a positive feedback loop between personality and environment (Asendorpf & Neyer, 2012, p. 272). Thus, we need to ask if not only musical participation influences personality development, but also if personality influences musical participation.

In our exploratory longitudinal study, we aimed to examine the interrelations between musical participation and personality development in a longitudinal design. Specifically, we examined causal inferences between musical participation and personality development in the five domains of openness, extraversion, neuroticism, conscientiousness, and agreeableness (Big Five). By better understanding these interrelations, we hope to provide a basis for further research and theory building on the relationships in question.

2. Five-Factor Model of Personality Development

A person's personality describes her individuality with respect to bodily appearance, behavior and experiences compared to other people (Asendorpf, 2015, p. 1). The five-factor model of personality (FFM) is based on the idea that there are five broad dimensions of personality that are relatively stable throughout an individual's lifespan and that are relevant across cultures. The Big Five dimensions (McCrae & Costa, 1987; Goldberg, 1993) are openness, conscientiousness, extraversion, agreeableness, and neuroticism. While openness is characterized by an appreciation for new experiences and an openness to different ideas and perspectives, conscientiousness is characterized by a sense of responsibility and dependability as well as being organized and disciplined. Extraversion refers to a desire for social interaction and a preference for being in

the center of attention. Agreeableness is shown by a tendency to be cooperative and considerate of others and a willingness to coordinate with others. Finally, neuroticism is characterized by a tendency to experience negative emotions such as anxiety and sadness (Asendorpf, 2015, p. 65). The FFM of personality has become one of the most widely used and researched models of personality in the field of psychology, and it has been used in a variety of research studies including music education and related research (Hasselhorn et al., 2022; Sander et al., 2021; Krause et al., 2021).

2.1 Musical Participation and Personality Development

Does musical participation influence personality or is it rather the case that people choose ways of musical participation according to their personality traits? This question has been widely discussed by researchers from different fields (Kröner, 2013; Hasselhorn et al., 2022; Sander et al., 2021; Krause et al., 2021), including music education. Personality “traits are relevant to public policy” (Bleidorn et al., 2019, p. 4) because they impact individual, societal, and educational success (Bleidorn et al., 2019, p. 4).

In line with a broad concept of culture, musical participation can be situated in formal or informal contexts, and it can be active or passive. The variety of musical practices that people possibly engage in and that they value even increases: for example, the digital musical practices have emerged in recent years (UNESCO-UIS, 2012, p. 8; Krupp-Schleußner & Lehmann-Wermser, 2018; Krupp & Beisiegel, i. pr.). Especially high-cultural activities, such as listening to classical music or attending classical concerts, can also be interpreted as cultural capital; consequently, issues of musical participation are often connected to questions of social and educational justice (Krupp-Schleußner, 2016).²

All forms of musical activities shape people’s lives, and especially for young adults, music plays an important role when it comes to developing one’s own identity or to adopting a certain lifestyle (Lamont, 2011; MacDonald et al., 2002; Müller et al., 2002). From this perspective, one could expect that young people engage in those musical activities that are consistent with their personality and identity (Kröner et al., 2008; Wrzus & Roberts, 2017) and in which certain personality traits can be reenforced. Consequently, various forms of musical participation may be related in different ways to specific personality traits (Hasselhorn et al., 2022). According to theoretical models, both ways are possible: Personality traits are rather stable across the lifespan, but personality also

2 The fact that musical participation is such a broad concept implies that it is also hard to find reasonable ways of measuring it. This means that for every study dealing with cultural participation, one carefully needs to know which ways of participating in music are considered and which are not. Studies and their results are not often directly comparable.

undergoes certain key transitions throughout life (Sander et al., 2021, p. 2). Furthermore, life events can affect personality but “likely unfold in a slow and incremental way over relatively long periods of time” (Bleidorn et al., 2018, p. 85).

3. Research on Musical Participation and Personality Development

The role that musical (or cultural) participation plays in the development of an individual’s personality has been examined and discussed in music-related research (Kröner et al., 2012; Kröner, 2013; Hasselhorn et al., 2022; Sander et al., 2021). However, the results of these studies are inconsistent, and there are hardly any longitudinal studies that allow for a robust examination not only of correlations, but also of causal directions of the relationships in question. Those few exceptions are the studies of Sander et al. (2021), which investigated leisure activities in general (and musical activities as a part of those) as a driver of personality development, and a study by Kröner et al. (2008), which discusses the direction of the causal relationships between cultural activities and openness in a longitudinal design with two measurements.

The strong relationship between openness and musical participation has been shown generally for children and young adults (Corrigall et al., 2013; Lehmann-Wermser & Krupp-Schleußner, 2017; Hasselhorn et al., 2022; Krause et al., 2021) with respect to highbrow cultural activities (Kröner et al., 2008) and participation in music across the lifespan (Krause et al., 2021; Sander et al., 2021). In this case, openness is mostly seen as a predictor for cultural activities. This might be explained, in part, by the fact that music often requires individuals to be open to new experiences, styles and genres, as well as to the ideas and perspectives of other musicians. The question if openness is also influenced by musical participation in some kind of feedback loop remains open. The above studies show no or only very weak interrelations between musical participation and the other four dimensions of the Big Five.

Two recent studies focus on the longitudinal development of musical participation and personality and ask how they influence each other (Hasselhorn et al., 2022; Sander et al., 2021). Hasselhorn et al. (2022), in contrast to previous studies³, use a more differentiated approach to operationalize musical participation and study the relationship between personality traits (Big Five) and formal and informal musical participation. Using a structural equation and a cross-section-

3 Participation in music culture is usually operationalized in a rather under-complex way, especially in large panel studies (e.g., SOEP) in terms of high-cultural leisure activities or learning an instrument. Although this seems plausible in terms of research pragmatics, it bears the risk of ignoring the effects of other forms of participation or of overestimating the effects of particular types of participation.

al approach, the authors showed that two dimensions of musical participation (formal and informal) correlate to different extents with different personality dimensions: Openness is significantly correlated with both dimensions of participation, while neuroticism and agreeableness are rather correlated with informal musical practices. Only formal musical participation is correlated with conscientiousness. However, except for openness, which showed a considerable correlation with both forms of participation, all correlations are rather weak. The authors conclude that children and young adults might choose musical activities according to their personality traits from the very beginning and that only in a second step, a feedback-loop between personality development and musical participation might be initiated. This needs to be further investigated in a longitudinal design.

Sander et al. (2021) conducted such a longitudinal study using survey data from the German Socio-Economic Panel (SOEP). They studied leisure activities (playing music, singing, dancing, playing theatre, photography) as drivers for personality development in different age groups (18- to 75-year-old persons). Their results are based on a random-intercept cross-lagged panel modelling (RI-CLPM) approach. This approach explicitly distinguishes between-person from within-person differences (Hamaker et al., 2015), which represents a major methodological advantage compared to previous studies (see section 4.3). The authors showed that, on the between-person level, “artistic and musical activities” were positively correlated with openness (high correlation), extraversion (weak correlation), and agreeableness (weak correlation), but negatively correlated with neuroticism and conscientiousness (Sander et al., 2021, p. 21). Their longitudinal analyses generally showed only weak relationships between all constructs on the within-person level. A constant positive correlation with artistic and musical activities could be found only for openness. Although the study used longitudinal data, it can be interpreted only on a very general level due to the data structure of the SOEP data: Only one item (*Artistic and musical activities*, which is a sum score of playing music, singing, dancing, acting, painting, and photography (Sander et al., 2021, p. 5)) included musical participation and other leisure activities at the same time.

Although studies suggest that participation in music may be related to certain personality traits, these studies have produced heterogeneous results, especially when it comes to studying causal influences. In summary, most studies on the relationships in question here are limited due to their reliance on cross-sectional data and/or very general constructs of musical participation.

The present paper examines how musical participation and personality development influence each other over time. Using a longitudinal design and a differentiated approach to musical participation, we wanted to gain more reliable insights on the relationships between musical participation and personality development.

4. Design of the Study

To answer our research question, we used data from the study “Music and Personality.” The project was carried out from 2018–2022 and aimed at researching the relationship between musical participation, personality development and wellbeing for students in Grades 5 to 8. Within a longitudinal cohort design, three cohorts (Grades 5, 6, and 7 in 2019) were surveyed with digital questionnaires three times between 2019 and 2021. First results have been published (Hasselhorn et al., 2022; Beisiegel & Krupp, 2021; Krupp & Beisiegel, i. pr.).

4.1 Sample

For our analysis, we used a sample of $n = 1,385$ students (58.9% female / 41.1% male). These students participated in at least two of the three measurements ($t_1 - t_3$). On average, they were 10 (Grade 5), 11 (Grade 6), or 12 (Grade 7) years old in the first measurement (t_1) in autumn 2019⁴ (cf. Tab. 1). In this first measurement, a total of 23 schools (different school types within the German system⁵) participated in the study. 138 classes were surveyed.

Table 1: Sample description (cohorts and grades)

Cohort	Grade		
	t_1 (2019)	t_2 (2020)	t_3 (2021)
1 (n = 498)	5	6	7
2 (n = 446)	6	7	8
3 (n = 441)	7	8	9

4.2 Variables and Scales

Musical Participation (formal and informal)

In accordance with Krupp-Schleußner (2016), two scales were estimated using an IRT modeling approach⁶. These scales mapped the musical participation of the surveyed students. The scale *formal musical participation* (formal) comprised 12 items, and the scale *informal musical participation* (informal) scale

4 Due to the socializing function of school classes, the exact age was not collected.

5 Although a representative sample of schools was asked to participate in the study, mostly college-prep schools (Gymnasien) agreed to participate, while other school types (Realschule, Gesamtschule) are rather underrepresented in our sample.

6 R package *mirt*.

was composed of 10 items.⁷ While *formal participation* was covered by items that referred to formal music education (i.e., learning an instrument, taking part in music groups in school, going to classical concerts) *informal participation* referred to items such as playing music, listening to music, informal music learning or watching YouTube videos. The two scales represented subscales of a general factor within a bifactorial IRT model.⁸ For the analyses, the person parameters (EAP estimators) of the two subscales were included as manifest values in the structural equation model.

Big Five

For our study, we used a short version of the Big Five Inventory for children and young adults (BFI-K KJ; Kupper et al., 2019), which contains 26 items.⁹ Each item was answered on a 5-point-Likert-scale (0 = *disagree strongly* to 4 = *agree strongly*). For each scale, the arithmetic mean of the respective items was calculated.

Table 2: Big Five and Musical Participation Scales (Means [M], Standard deviations [SD], and Cronbach's α) with original Cronbach's α in brackets for Big Five in the first columns (Kupper et al., 2019).

Scale	T1				r_{11-12}	t2				r_{12-13}	t3			
	M	SD	n	α		M	SD	n	α		M	SD	n	α
Openness ($\alpha = .74$)	2.74	0.58	1301	.71	.61	2.59	0.62	913	.74	.69	2.59	0.63	735	.76
Extraversion ($\alpha = .78$)	2.39	1.03	1316	.84	.64	2.30	1.04	919	.87	.68	2.19	1.05	744	.88
Neuroticism ($\alpha = .79$)	1.83	0.75	1309	.70	.51	1.96	0.81	907	.77	.63	2.04	0.79	738	.77
Agreeableness ($\alpha = .57$)	3.00	0.60	1316	.63	.47	2.85	0.63	906	.67	.53	2.68	0.68	744	.71
Conscientiousness ($\alpha = .78$)	2.39	0.68	1343	.70	.63	2.22	0.69	928	.74	.66	2.20	0.68	747	.76
Formal musical participation	0.11	0.81	1352	/	.70	-0.17	0.80	932	/	.75	-0.05	0.83	757	/
Informal musical participation	-0.04	0.82	1352	/	.48	-0.09	0.80	932	/	.43	-0.14	0.78	757	/

7 For a list of all items see Hasselhorn et al. (2022, p. 613).

8 Fit-Indices of the multidimensional Item Response Modelling (bifactor model with general factor): RMSEA = .04, TLI = .97, CFI = .98; Empirical Reliability: formal participation: ER = .61, informal participation: ER = .72 (c.f. Hasselhorn et al., 2022, p. 614).

9 For the complete inventory see Kupper et al. (2019, p. 96).

4.3 Strategy of Analyses: Random-Intercept Cross-Lagged Panel Models

Cross-lagged panel models (CLPM) are commonly used to study longitudinal relationships and causal influences between two or more variables. To do so, the model contains cross-lagged parameters, which can be “interpreted in terms of *predicting change*” on a within-person level (Hamaker et al., 2015, p. 104). In CLPM, “stability of the constructs is controlled for through the inclusion of autoregressive relationships” (Hamaker et al., 2015, p. 102). The closer these parameters are to 1, the more stable the rank order of individuals is from one measurement to the next (Hamaker et al., 2015, p. 104). This type of stability can be referred to as *temporal stability*. For our analyses, we used an extension of this model which was proposed by Hamaker et al. (2015, see also Mulder & Hamaker, 2021) and had already been applied in a study on interdependencies of personality development and leisure activities (Sander et al., 2021).

The original CLPM assumes that “every person varies over time around the same means [...] and that there are no trait-like individual differences that endure” (Sander et al., 2021, p. 104). However, especially for psychological constructs, we can assume that there are *trait-like* differences, and that the corresponding *trait-like* stability leads to stable between-person differences from the very beginning, which are ignored in the original CLPM. Hamaker et al. (2015) added a (latent) random intercept to the model which accounts for *trait-like* stability. The random-intercept cross-lagged panel model (RI-CLPM) consequently considers between-person and within-person differences at the same time (Mulder & Hamaker, 2021). It “is an attempt to disentangle the within-person process from stable between-person differences [...]” (Mulder & Hamaker, 2021, p. 105). The original CLPM is nested under the RI-CLMP¹⁰.

Model Identification

The use of RI-CLPM allows for a variety of combinations of autoregressive, cross-lagged, or correlative paths. To answer our research questions, 10 nested RI-CLP models were calculated for each Big Five personality dimension with both participation facets. Figure 1 shows a graphical representation of the specified RI-CLP models. All models were identified by using Mplus7 and applying a Maximum Likelihood Robust (MLR) approach. The MLR estimator is “robust to data missing at random and non-normality” (Zyphur et al., 2020, p. 667). Missing data were treated using the *Full Information Maximum Likelihood-procedure (FIML)* (Enders, 2010). To deal with the cohort structure, we carried out analyses with the command “type = complex”, using the respective class as the grouping variable.

¹⁰ For a graphical comparison of the two models see Hamaker et al. (2015, p. 103).

For all models, the three latent variables in the between-person component (FP = formal musical participation, IP = informal musical participation, P = personality dimension) were formed/estimated from the manifest variables of the respective construct. The values of the three measurement points were weighted equally.

The latent variables in the within-person component were each formed with the same weight from the associated variable (construct and measurement point). For the within-person component, all autoregressive paths from t1 to t2 and from t2 to t3 were freely estimated. For the measurement time points, the correlations between the participation facets were also freely estimated.

Examining Causality

To examine causal inferences, different models were specified based on all theoretically possible relation patterns. The models differed only in the cross-lagged paths and correlations between the respective personality dimension and the two participation facets in the within-person component. These were either freely estimated or constrained (cf. Fig. 1). This approach resulted in 10 different models for each personality dimension (cf. Tab. 3). This allowed for an identification of the best model and for an explorative examination of causal inferences. To decide which model best depicts the relationships in question, model comparisons between nested models (Satorra & Bentler, 2010) were calculated according to the Granger-Sims causality test (Zyphur et al., 2020), which allows

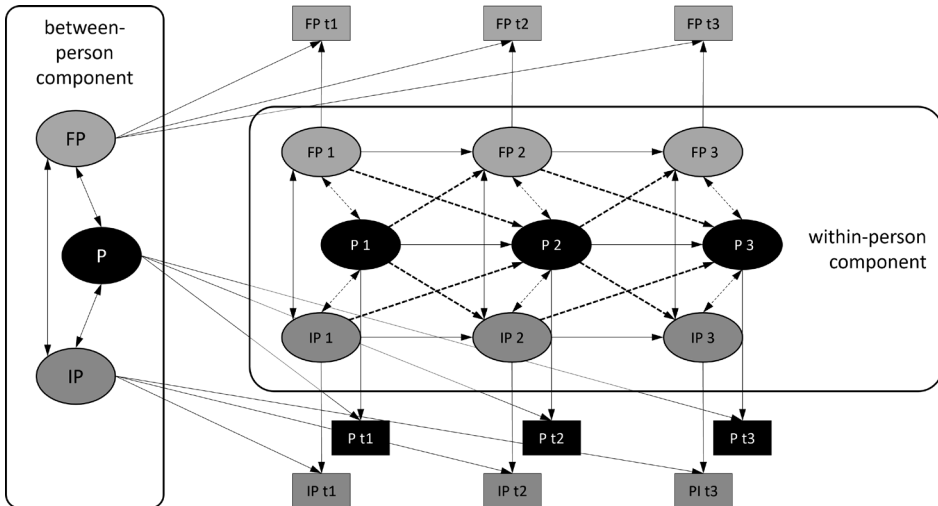


Figure 1: Graphical representation of the specified RI-CLP models for estimating the relationship between formal (FP) and informal musical participation (IP), and personality dimensions (P); dashed paths were changed for the model comparison analyses.

for examining causality by comparing models. This includes fitting a full RI-CLP model (cf. Tab. 3, Model 1) and then restricting specific paths to zero (cf. Tab. 3, Models 2–9). If the restricted model fits worse than the full model, the restricted paths “significantly improve the model when freely estimated” (Sander et al., 2021, p. 7). Additionally, all CL paths can be restricted to zero (cf. Tab. 3, model 10). Fit indices for all specified models can be seen in Table B (Appendix)¹¹. Most models fitted satisfactorily and made specific model comparisons possible.¹²

It should be noted at this point that we are not using a deterministic but a stochastic understanding of causality: The models we use, therefore, only give evidence on, not proof of, deterministic causalities (Zyphur et al., 2020). For comparing our models, we used a chi-square difference test using the Satorra-Bentler Scaled Chi-Square (Satorra & Bentler, 2010).

Table 3: Overview of the differences between the 10 specified RI-CLP models in the cross-paths (on) and the correlations (with) between personality dimension (P), formal musical participation (FP), and informal musical participation (IP).

		P (tn) on FP (tn+1)	P (tn) on IP (tn+1)	FP (tn) on P (tn+1)	IP (tn) on P (tn+1)	P (tn) with FP (tn)	P (tn) with IP (tn)
model 1 (full)	<i>P predicts FP and IP AND FP and IP predict P</i>	<i>E</i>	<i>E</i>	<i>E</i>	<i>E</i>	<i>E</i>	<i>E</i>
model 2	<i>P predicts FP and IP</i>	<i>E</i>	<i>E</i>	<i>o</i>	<i>o</i>	<i>E</i>	<i>E</i>
model 3	<i>FP and IP predict P</i>	<i>o</i>	<i>o</i>	<i>E</i>	<i>E</i>	<i>E</i>	<i>E</i>
model 4	<i>P predicts FP AND FP predicts P</i>	<i>E</i>	<i>o</i>	<i>E</i>	<i>o</i>	<i>E</i>	<i>o</i>
model 5	<i>P predicts IP AND IP predicts P</i>	<i>o</i>	<i>E</i>	<i>o</i>	<i>E</i>	<i>o</i>	<i>E</i>
model 6	<i>P predicts FP</i>	<i>E</i>	<i>o</i>	<i>o</i>	<i>o</i>	<i>E</i>	<i>o</i>
model 7	<i>FP predicts P</i>	<i>o</i>	<i>o</i>	<i>E</i>	<i>o</i>	<i>E</i>	<i>o</i>
model 8	<i>P predicts IP</i>	<i>o</i>	<i>E</i>	<i>o</i>	<i>o</i>	<i>o</i>	<i>E</i>
model 9	<i>IP predicts P</i>	<i>o</i>	<i>o</i>	<i>o</i>	<i>E</i>	<i>o</i>	<i>E</i>
model 10	<i>No predictive relationship</i>	<i>o</i>	<i>o</i>	<i>o</i>	<i>o</i>	<i>o</i>	<i>o</i>

Notes: *E* = estimated, *o* = restricted to 0.

11 The appendix for this article can be downloaded from the publisher’s homepage at www.waxmann.com/buch4764.

12 The fact that the TLI is very low in some models can be linked to very weak correlations between some of the variables. If this is the case, the TLI is not suitable anymore as a fit index. We report it anyway but build our comparisons on the other indices.

5. Results

Table 2 (see above) shows the descriptive results, means and standard deviations of all study variables across the three measurements. The intercorrelations between all personality dimensions and musical participation can be found in Table A (Appendix)¹³. In the following sections, we present the results for each of the five personality domains separately. Results for the best fitting RI-CLP model for each personality domain can be seen in Table C (Appendix).¹⁴

5.1 Musical Participation and Neuroticism

For neuroticism, Model 2 proved to fit the data best ($Chi^2 = 45.377$, $df = 11$, MLR *corr. fac.* = 1.091, $RMSEA = .048$, $CFI = .972$, $SRMR = .033$). As the cross-lagged paths from formal and informal participation are restricted to zero in this model, we could conclude neuroticism is more likely to influence decisions for or against both facets of participation than the other way around.

In the between-person component, the correlations between the time-stable components of neuroticism and the participation facets showed a fundamentally negative correlation with formal participation ($r = -.199$, $p < .001$) and a positive correlation with informal participation ($r = .295$, $p < .001$). The within-person component accounted for only a small proportion of variance, which means that most of the variance could be explained already by the between-person part of the model. This was reflected, on the one hand, in the low explanation rates (R^2 between .013 and .167) and, on the other hand, in the fact that both the autoregressive and the cross-lagged paths only reached partial significance. Only in t_1 , the path from neuroticism to formal musical participation at t_2 could assert itself statistically ($\beta = .184$, $p < .001$). Nevertheless, this model is statistically superior to the other models.

5.2 Musical Participation and Extraversion

The interrelationship between musical participation and extraversion can best be explained with Model 10, in which all paths are restricted to zero ($Chi^2 = 37.587$, $df = 21$, MLR *corr. fac.* = 1.311, $RMSEA = .024$, $CFI = .986$, $SRMR = .032$). While on a between-person level, there were very weak correlations between extraversion and informal ($r = .196$, $p < .001$) and formal ($r = .072$, $p < .001$) participation, no cross-lagged relations between participation and extraversion could be ob-

¹³ The appendix for this article can be downloaded from the publisher's homepage at www.waxmann.com/buch4764.

¹⁴ The appendix for this article can be downloaded from the publisher's homepage at www.waxmann.com/buch4764.

served over time on the within-person level. As in the case for neuroticism, the within-person component accounted for only a small proportion of the variance (R^2 between .027 and .178). This means that in our sample, extraversion and musical participation did not influence each other over time in any direction, but that the relationship between the two dimensions existed a priori.

5.3 Musical Participation and Openness

The model results show clearly that Model 2 explains best how openness and musical participation are interrelated ($Chi^2 = 64.946$, $df = 11$, $MLR\ corr.\ fac. = .899$, $RMSEA = .060$, $CFI = .955$, $SRMR = .036$). In this model, the cross-lagged paths from participation (FP/IP) are restricted to zero. First, we could see here that on a between-person level, openness was significantly correlated only with formal participation ($r = .180$, $p < .001$). This correlation remained significant on a within-person level across all three measurements (r between .107 and .190). Informal participation was significantly correlated also with openness only in t_3 . Additionally, we could observe significant cross-lagged paths from openness on formal participation ($t_1 \rightarrow t_2: \beta = .171$, $p < .001$) and from openness on informal participation ($t_2 \rightarrow t_3: \beta = .257$, $p = .020$). We could conclude here that openness influences formal participation and, over time, also informal participation.

5.4 Musical Participation and Conscientiousness

We can state with Model 1 that musical participation and conscientiousness influence each other over time ($Chi^2 = 55.276$, $df = 7$, $MLR\ corr.\ fac. = .789$, $RMSEA = .071$, $CFI = .968$, $SRMR = .028$). While we could see no significant correlations on the between-person level, we could observe on the within-person level that conscientiousness significantly influenced formal participation ($t_1 \rightarrow t_2: \beta = .256$, $p = .007$) and vice versa: There were even stronger effects from formal participation on conscientiousness ($t_1 \rightarrow t_2: \beta = .353$, $p < .001$; $t_2 \rightarrow t_3: \beta = .350$, $p < .001$). From t_1 to t_2 , conscientiousness positively effected informal participation ($\beta = .190$, $p = .011$), but at the same time, we could observe here a negative effect from informal musical participation on conscientiousness ($\beta = -.135$, $p = .006$).

5.5 Agreeableness is Related to Informal Musical Participation

Finally, we could see that Model 5, in which all paths between agreeableness and formal musical participation are restricted to zero in the within-person model, explains our data best ($Chi^2 = 61.017$, $df = 14$, $MLR\ corr.\ fac. = .960$, $RMSEA = .049$, $CFI = .956$, $SRMR = .034$). Agreeableness at the between level was more strong-

ly related to informal musical participation ($r = .266, p < .001$) than to formal musical participation ($r = .093, p = .001$). In contrast, there were no stable correlations between agreeableness and informal musical participation on the within-person level. Only from t1 to t2 could we observe one significant cross-lagged path between informal participation and agreeableness ($\beta = -.140, p < .001$).

6. Discussion

The aim of this study was to investigate how musical participation and personality development influence each other using longitudinal data from students from Grades 5 to 9. Overall, the data provide evidence that influences can be found in both directions, which is an important result. This is in line with Kröner's model of person-environment-transaction: Not only does participation influence personality development (in some cases), but a person's personality also predetermines – at least in part – how the person participates. Our model comparisons suggest that certain personality characteristics in the dimensions of neuroticism, openness, agreeableness, and conscientiousness enhance informal participation. Formal participation, in turn, is enhanced by neuroticism, openness, and conscientiousness. In the other direction, data suggest that informal musical participation influences the development of agreeableness and conscientiousness, whereas formal musical participation influences conscientiousness.

When we look at the between-level in more detail, we could first state that the five personality traits are differently related to the two dimensions of musical participation: While there were significant positive correlations between openness and both formal and informal participation, neuroticism was correlated negatively with formal and positively with informal participation. Agreeableness was positively correlated with both dimensions of participation, though the correlation with informal participation was much stronger. Extraversion was correlated positively with both formal and informal participation, but there was only a weak relationship between extraversion and formal participation. There were no correlations between conscientiousness and musical participation on the between-person level. Except for openness, all correlations were rather weak. These results slightly differ from those of Sander et al. (2021), which might be explained by different age groups in our samples and by a different operationalization of musical participation.

The analysis of the cross-lagged paths on a within-person level for the five personality domains reveals different results for each domain. The most important result is that only a positive influence from formal participation on personality could be found for one domain: Over time, young adults who are musically engaged in formal contexts seem to gain conscientiousness, while a higher engagement in informal contexts leads to less conscientiousness, at least tempo-

rarily. Openness, as expected, is significantly related to a higher engagement in both formal and informal musical practices. For all other domains, there is some evidence to suggest that young adults choose activities that cohere with their personality traits than the other way round. The within-person model does not show any cross-lagged influences at all for extraversion.

In fact, our data only allow a glimpse into a small window of personality development, which begins much earlier and lasts even longer than our data can depict. Moreover, musical participation, especially formal musical participation, usually begins much earlier than in Grade 5. It is possible that there are timeframes for the influence of musical participation on personality, especially on openness, even before the 5th grade. It is certainly a methodological challenge to investigate this hypothesis, but the findings of this study show that influences can generally be expected.

Personality traits are very relevant for policymakers, “both as predictors of success and as actionable targets” (Bleidorn et al., 2019). Additionally, in the context of music education, the fact that musical practice drives personality development is an important argument for the development and public funding of musical offers. Particularly, openness and conscientiousness can be seen as relevant traits here as our results and the results of other studies show (Sander et al., 2021). The fact that openness leads to participation in both formal and informal contexts is not surprising. Young adults who are open to new experiences possibly seek to get more of these experiences. But this also means that there are possibly strong effects of self-selection when it comes to the question of who takes advantage of musical educational offers. Therefore, policymakers and educators need to critically ask themselves, how children who wouldn’t be there in the first place could also profit from musical offers: This could be a matter of actively motivating young people or a matter of redesigning musical offers to make them more attractive for all.

This becomes even more relevant as we see that in the context of formal musical offers, students tend to become conscientious, and that this is not the case in informal musical contexts. As conscientiousness is a strong predictor of educational success in later life (Borghans et al., 2008), music education could have a strong impact here. This makes it all the more important that such offers are open to as many young people as possible. Here also, studies of these relationships in early childhood are needed.

On the other hand, we can also see that young adults who tend to be more neurotic rather engage in informal musical practices. This could be explained by the fact that formal musical contexts are characterized by higher emotional pressure than informal contexts with respect to training and competition. Such contexts might negatively reinforce neurotic tendencies and lead to negative experiences.

Our longitudinal design allows for tentative conclusions regarding causal inferences that need to be further investigated in the future. Although the results

are preliminary, we can show that the assumption that musical participation influences personality is simply too general and has to be taken with a pinch of salt. Our exploratory study paints a first and more nuanced picture of the relationships between musical participation and the Big Five personality traits in young adulthood and shows that (1) longitudinal data bring important insights and that (2) if musical participation is assessed more in a differentiated way, these insights can be much more specific.

7. Conclusion and Limitations of the Study

The aim of this exploratory study was to examine the (causal) relationships between the Big Five personality traits and formal and informal musical participation. Using a RI-CLMP on three measurement points of data from the study “Music and Personality,” we could show that on a between-person level, differences in formal and informal musical participation were mostly related with openness and that there are weaker relationships between musical participation and the other four dimensions of the Big Five. Based on these results, specific hypotheses on these relationships can now be formulated and investigated in detail.

Due to the Corona pandemic, data acquisition has become more and more difficult after the first measurement point. Although our sample is sufficiently large for the analyses presented in this paper, we cannot be sure about the effects that a lasting pandemic has had on the children’s personality development. As a crucial life event, the pandemic could have observable effects on personality development after a few months. Another limitation is that participation patterns certainly have changed, especially in formal contexts, as musical activities had to be shut down for a long time. Therefore, replication studies are necessary to verify these findings.

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Valerie Krupp
Johannes Gutenberg-Universität Mainz
Hochschule für Musik Mainz
Jakob-Welder-Weg 28
55128 Mainz
krupp@uni-mainz.de

Johannes Hasselhorn
Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU)
Lehrstuhl für Musikpädagogik und -didaktik
Regensburger Straße 160
90478 Nürnberg
johannes.hasselhorn@fau.de