Music Teachers' Motivation and Need Satisfaction Before and During the COVID-19 Crisis

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Abstract

After the WHO (2020) declared COVID-19 a pandemic in March 2020, the world was forced to move online. Instrumental music instruction was also affected by this situation. This paper presents a study which focuses on teacher motivation and assessment of music teachers' working conditions before (retrospective assessment) and during (N = 112) the COVID-19 crisis in Austria.

The study investigated the extent to which the transition to online instrumental music instruction impairs motivation and the satisfaction of basic psychological needs among music teachers. The theoretical basis of the study is self-determination theory, which distinguishes between autonomous and controlled forms of motivation and assumes that the satisfaction of basic psychological needs is essential for the development of autonomous motivation. The results of the study primarily indicate that autonomous motivation is rated significantly lower when online instruction is enforced compared to pre-pandemic motivation. In contrast, controlled forms of motivation did not change before and during the pandemic. Furthermore, the satisfaction of basic psychological needs appeared to decrease significantly with enforced distance teaching. A structural equation model showed that the variance in autonomous forms of motivation is best explained by satisfaction of the basic need for autonomy, perceived restrictions and age. Another structural equation model looking at pre-pandemic data similarly points to the varying differential importance of needs for instructor motivation.

Keywords

Basic psychological needs, teachers' motivational regulation, instrumental music instruction, distance learning, COVID-19, self-determination theory

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> You learn to appreciate many things
> when you no longer have them.

From the perspective of cultural studies, learning a musical instrument is relevant for the attribution of identity and the cultural memory of a country (Szabó-Knotik, 2004). In the "music country Austria" (Szabó-Knotik, 2004) most people learning a musical instrument attend a music school. Music schools in Austria are independent institutions outside the formal education system. These institutions offer not only instrumental and vocal instruction (major subjects) but also music theory, ensemble, and orchestral playing (minor subjects). Teaching and learning at music schools usually take place in individual lessons, sometimes in groups on a weekly basis. Music schools are open to all age groups and financed, on average, 80% by public funds and 20% by school fees. When the World Health Organization (WHO, 2020) declared COVID-19 a pandemic in March 2020, people had to switch to online modes in several areas of their lives. The education sector was also massively affected, with over 90% of all students worldwide no longer able to participate in face-to-face classroom teaching. Forced to do so, educational institutions transferred to online teaching and learning. This transition can be described as more or less successful, depending on the staff's skills and technical equipment. Based on Marshall et al. (2020), teachers during forced distance teaching reported limited scope of action, difficulties with technical conditions and a lack in communication with their students. This was a particular challenge for musical instrument lessons, where the synchronicity of interaction or the quality of 'sound transmission' is essential. Therefore, our initial hypothesis was that this transition would not be frictionless for teachers, and that the change to distance teaching would negatively affect autonomous forms of motivation. With the sudden conversion to online teaching, the learning environment of instrumental music teachers changed drastically. They had to adapt their teaching concepts and deal with the technical challenges of enforced distance teaching.

The theoretical basis for the study was the self-determination theory (SDT) (Ryan & Deci, 2017), which conceptualises different styles of motivational regulation depending on the degree of autonomy. It assumes that autonomous forms of motivation are supported by the satisfaction of basic psychological needs (BPNS) for autonomy, competence, and social relatedness. Thus, BPNS is essential for the maintenance and development of autonomous forms of motivation in instrumental teaching and learning (cf. e. g. Evans, 2015). Consequently, we hypothesized that teachers would exhibit lower basic psychological need satisfaction (BPNS) and perceived constraints. Accordingly, teacher motivation should be less autonomous and more controlled than before the pandemic.

In the past months, several studies based on SDT concerning student motivation in enforced online learning were published (e. g. Chiu, 2021a, 2021b; Chiu et al., 2021; Holzer et al., 2021; Müller et al., 2021a; Pelikan et al., 2021; Wong, 2020). This is not surprising, since student motivation was already a prominent field of research before the pandemic

(cf. Taylor et al., 2014). In contrast, less research was conducted on teacher motivation. No studies on teacher motivation in distance learning, especially for instrumental music instruction, and based on SDT, could be found.

In this empirical study, we investigated whether the motivation of music teachers to teach in enforced distance settings differs from that in face-to-face teaching. Furthermore, the aim of this study was to explore the conditions of teacher motivation in distance teaching. In terms of SDT, the conditions of motivation refer primarily to the satisfaction of the basic psychological needs for autonomy, competence, and relatedness. Here, Austrian music teachers were interviewed during the pandemic about their motivation, the BPNS, the perceived restrictions due to enforced distance teaching and learning, and their technical equipment. In addition, they had the opportunity to assess their motivation and the BPNS before the pandemic while face-to-face lessons were still possible retrospectively.

The article first provides an overview of the SDT and then summarises relevant literature on teacher motivation, teaching a musical instrument, and motivation in distance learning. Furthermore, this article suggests directions for future research and concludes with practical implementations.

1 Self-Determination Theory (SDT)

Similar to other motivational concepts, SDT (Ryan & Deci, 2017) distinguishes between extrinsic and intrinsic motivation. In SDT, intrinsic motivation is considered to be self-determined and not determined or influenced by external factors. In contrast, extrinsic motivation occurs when behaviour has a more or less instrumental character. For example, people act to obtain a reward or avoid anticipated negative consequences. SDT differs from other theories of motivation in two aspects. In addition to the focus on cognitive and emotional factors, SDT (1) focuses on behaviours that arise from the interaction of people with their environment (Evans, 2015) and (2) makes qualitative distinctions concerning extrinsic motivation (Ryan & Deci, 2002, 2017). (See Figure 1.) Accordingly, SDT distinguishes between the following four regulatory styles of extrinsic motivation and intrinsic regulation, which can be arranged on a continuum from self-determination to heteronomous control (fig. 2): intrinsic regulation, integrated regulation, identified regulation, introjected regulation, and external regulation. First, *intrinsic regulation* is a regulation style that is accompanied by fun, joy, interest, and inquisitiveness. Intrinsic regulation is the prototype of self-determined motivation. Second, more than any other extrinsic motivation, *integrated regulation* depends on self-determination. It results from the integration of values and regulations into one's coherent sense of self (Deci & Ryan, 1994). Third, within *identified regulation*, "[...], the focus is on the personal relevance of an action: when a learner, for example, identifies with the values and tasks of a learning arrangement and also integrates them into his or her self' (Müller & Louw, 2004, p. 171).

Fourth, the regulatory style of *introjected regulation* includes behaviour aimed at contingencies that relate to one's self-esteem. For example, one attends a music school to impress others, or because it is 'right and proper' to act in a certain way. "The cause of action may come from the person him/herself, yet is not controlled by the autonomous self, it is external to the person's sense of self" (Müller & Louw, 2004, p. 171). Fifth, *external regulation* depends on external contingency, for example, to attain rewards or to avoid negative feedback from colleagues or supervisors. This regulatory style can be described as the 'classical' extrinsic motivation.

In SDT-based studies, it has become established that intrinsic and identified regulation are combined to autonomous motivation, and external and introjected regulation to controlled motivation (Vansteenkiste et al., 2009). Integrated regulation is usually not assessed separately because the correlations with intrinsic motivation are very high and can hardly be separated empirically (Vallerand et al., 1992).

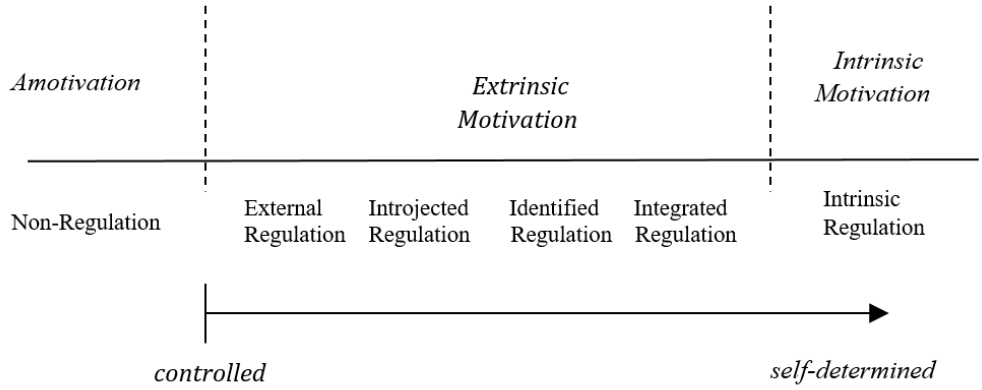

Figure 1: Continuum of self-determination (based on Ryan & Deci, 2002, p. 16)

For the development and maintenance of autonomous forms of motivation, the satisfaction of basic psychological needs for autonomy, competence, and social relatedness is essential (Ryan & Deci, 2017). This is because basic psychological needs provide our psychological system with information and feedback on the quality of the person-environment interaction (Krapp, 2005). That is, the satisfaction or dissatisfaction of basic needs tells us whether we are acting congruently with our 'individual self'. This quality of person-envi-

ronment interaction is particularly important in the educational context, since learning and teaching are directly linked to other people and the (learning) environment.

Evans (2015) sees SDT, especially in music, as a suitable theoretical framework. It provides a broad range of explanations for motivational behaviour in this field. Furthermore, he emphasised the satisfaction of the three basic needs in the music context.

Autonomy: Numerous studies have shown that support for autonomy is a key factor in the development and maintenance of autonomous motivation (Ryan & Deci, 2017). Teacher research has also repeatedly shown that teachers who perceive their working conditions at school as autonomy-supportive show higher autonomous motivation and well-being (Slemp et al., 2020).

Competence: The feeling of competence and the self-efficacy associated with it, as well as the ability to perform play an essential role in autonomous forms of motivation (Van den Broeck et al., 2010). For example, O'Neill and Sloboda (1997) showed that musicians who believed in their competence and musical development made more progress than those who defined their competence as unchangeable.

Social Relatedness: In addition to autonomy and competence, social connectedness may also play an important role in the development of autonomous forms of motivation, which is also true for the domain of instrumental music (cf. Evans 2015; Evans et al., 2013). The reason for this is, among other things, that teaching and learning an instrument involves social belonging, collaboration and affiliation (Philippe, Schiavio & Biasutti, 2020).

2 SDT Research on Instrumental Music and Motivation

A literature review on the conditions, processes, and outcomes of teacher motivation in instrumental teaching reveals the following considerations:

(1) Similar to research in other domains, studies on the conditions and processes of self-determined learning motivation can be found in the field of music education as well (Freer & Evans, 2019; Kingsford-Smith & Evans, 2019; MacIntyre et al., 2018; Miksza et al., 2019). (2) Only a few studies have used SDT as a theoretical framework and dealt with instrumental music in particular (Comeau et al., 2015; Evans & Liu, 2019; Liu et al., 2015; Schatt, 2018; Wieser, 2018). This is especially true for studies focusing on teacher motivation. (3) Very little is known about the motivation of teachers and students in musical learning settings that take place outside regular schools.

2.1 Teacher Motivation

In general, intrinsically motivated teachers or teachers who pursue intrinsic goals apply a higher mastery approach to their practice (Malmberg, 2008) and show higher levels of

enjoyment and satisfaction in teaching and the teaching profession (Collie et al., 2016; Cuevas et al., 2018; Dinham & Scott, 1998). Numerous studies on motivating teaching styles and their effects on student motivation have been published (e. g. Jang et al., 2016; Reeve & Jang, 2006). In the last decade, several studies also dealt with teachers' own motivation regarding environmental factors, such as working conditions and their influence on teachers' motivation (e. g. Müller et al., 2009; Pelletier et al., 2002; Slemp, Field & Cho, 2020; Taylor et al., 2008). In contrast, SDT-related research on teacher motivation in instrumental music is limited to the instructional context, and teachers' motivational styles and their effects on student learning (Cheon et al., 2018). For example, studies have shown that teachers, who adopt an autonomous supportive style show higher capacity for empathy, promote students' interests, set optimal requirements according to the performance level of their students, and address students' needs (Küpers et al., 2014).

Studies dealing with contextual conditions such as working conditions and the impact of BPNS on music teachers' motivation in instrumental music instruction cannot be found. Especially in times of enforced distance teaching and learning, which is a big challenge in instrumental teaching, motivation and BPNS can suffer substantially. Moreover, restrictions, fewer options in lesson planning as well as a lacking technical equipment for online teaching may have an influence on BPNS and motivation during the pandemic.

When reviewing the literature on motivation in online-based music education, the following can be summarized: Studies dealing with online music lessons or even online instrumental lessons are scarce (e. g. de Bruin, 2020; Hash, 2021). This is true for research on the quality and quantity of motivation of students and teachers alike. If there is research on this topic, the focus is primarily on aspects in the learning environment that are relevant for students' engagement and motivation (Johnson, 2017; Ng, Ng & Chu, 2022). We are not aware of any studies that address teacher motivation during enforced distance learning in music education.

3 Aims and Hypotheses

The aim of this study was to determine the extent to which teachers' motivational regulation and perception of basic needs differed between the time of conventional teaching and enforced distance learning. In addition, by using structural equation modelling, we investigated whether teachers' motivational regulation in enforced distance learning could be explained. Furthermore, we examined whether the SEM related to the situation before the pandemic differs from that related to the situation in forced distance learning.

Based on theoretical explanations and the research review, the following hypotheses were formulated:

H1a: Similar to recent studies conducted on the motivational differences between forced distance learning in the pandemic and face to face learning before (e. g. Müller et al., 2021b) teachers' autonomous motivation would be significantly lower in enforced distance learning than before the pandemic. H1b: Accordingly, controlled motivation would increase. However, the increase in controlled motivation should be rather small, since these forms of regulation are less situation-dependent and cannot be explained well by environmental variables (e. g. Vandenkerckhove et al., 2019).

H2: Based on the results of Marshall et al. (2020) and regarding SDT, these factors undermine the satisfaction of the three basic psychological needs. Therefore, we argue that perceived BPNS would be lower in enforced distance teaching than it was before the pandemic.

H3: Based on SDT (Ryan & Deci, 2017), the BPNS predicts autonomous types of motivation, whereas frustration predicts controlled types of motivation. Therefore, BPNS would be positively associated with autonomy and negatively associated with controlled forms of motivation. Because of the situation in enforced distance learning, it was exploratively examined whether both the perceived restrictions due to enforced distance teaching and the quality of teachers' technical equipment at home contribute directly or indirectly to the prediction of motivational regulation styles.

Additionally, we will examine whether teachers' age explains the two forms of motivation differently. Empirical studies provide evidence to support the proposition that older individuals are less motivated in a controlled manner than younger individuals (Sheldon et al., 2006; Sheldon & Kasser, 2001; Weman Josefsson et al., 2018). It is an open question to what extent age, especially in online instrumental lessons, is related to the satisfaction of needs and the quality of teacher motivation.

4 Method

4.1 Sample

In the present study, 112 music teachers (43% male, 57% female) from private music schools participated. The average age was 45 years (SD = 9.28), and in average they had 21 years (SD = 9.71) of teaching experience. The teachers taught a wide variety of instruments from wind and string instruments to piano. The most represented instrument group was wind instruments (39%), and the least represented was the vocal group (4.5%).

4.2 Procedure and Analyses

Due to the lockdown in spring 2020, it was not possible to hand out questionnaires directly in the music schools. Therefore, the questionnaire was converted into an online version. Music schools received an internet link in May 2020 to the questionnaire with the request to forward it to their teachers to complete it. Surveys took approximately ten minutes to complete. The received data did not contain missing values because the online questionnaire did not allow participants to proceed to the subsequent question without having answered the previous one. All questions were defined as mandatory fields.

In analysing the data, we used comparisons of means (paired sample t-test) to test the differences between the time before and during enforced distance learning for statistical significance. In addition, the effect sizes (Cohen's *d*) were calculated for comparison of means. For the confirmatory factor analyses (CFA) and structural equation models (SEM), chi-square statistic (χ^2), comparative fit index (*CFI*), and root mean square error of approximation (*RMSEA*) are reported. Following the suggestions of Kline (2016), *CFI* close to .95/90 and *RMSEA* close to .08/.06 were considered indicative of adequate model fit. All CFAs and SEMs were computed using Amos 28.0.

5 Measures

The questionnaire's design allowed teachers to give their assessments both before COVID-19 (conventional face-to-face teaching) retrospectively and during COVID-19 (enforced online teaching). All items of the reported scales of the teacher questionnaire had five response options from 'do not agree at all' (1) to 'agree very strongly'.

Motivational Regulation. A shortened version of the Self-Regulation-Questionnaire (Ryan & Connell, 1989), adapted for instrumental lessons, was used to investigate motivational regulation of teachers. It captures intrinsic regulation (e. g. 'I am engaged in my profession as a music teacher because I enjoy teaching young people') and the three forms of extrinsic motivation regulation styles[3] (e. g. identified regulation – '... to further develop my competence to teach an instrument'; introjected regulation – '... so that the parents think I am a good teacher', and extrinsic regulation – '... because I do not want any trouble with my school principal'). The same items were given twice: first to assess the perception of motivational regulation retrospectively and second, to assess the perception for enforced distance teaching.

Factor analysis showed that the four regulatory styles of motivation could not be statistically separated. Because of this, intrinsic and identified regulation were combined into one scale (autonomous motivation; $\alpha_{(\text{Before COVID-19})} = 69$; $\alpha_{(\text{Distance Teaching})} =. 77$) and intro-

3 Integrated regulation is not surveyed separately here (Ryan & Connell, 1989; Vallerand et al., 1992).

jected and extrinsic regulation into a second scale (controlled motivation; $\alpha_{(\text{Before COVID-19})}$ = 80; $\alpha_{(\text{Distance Teaching})}$ = .86). The forming of two constructs, autonomous and controlled motivation, is a common practice in SDT research (see, e. g. Vansteenkiste et al., 2009). The two-factorial solution demonstrates that the two motivational constructs can be statistically separated. Thus, CFA showed just acceptable model fit, with the RMSEA being slightly too high, $\chi^2(47) = 75.395$, $p = .005$, $CFI = 0.91$, $RMSEA = 0.073$.

Basic Psychological Needs Satisfaction (BPNS). To assess perceived basic psychological needs satisfaction, validated scales for the school sector (Müller & Hanfstingl, 2018) were used and only the term "teacher" was adapted to "music teacher" to fit the context ($\alpha_{(\text{Before COVID-19})}$ = .70 - .84; $\alpha_{(\text{Distance Teaching})}$ = .75 - .83). The same items were given twice: first to assess the perception of BPNS retrospectively and second, to assess the perception for enforced distance teaching. Considering that short scales were used to assess need satisfaction (two items; Autonomy – e.g. 'As a music teacher, I can work according to my own ideas', Competence – e. g. 'I feel that I can manage my work well', Social Relatedness – e. g. 'My colleagues support me in my work'), the reliabilities can be rated as good. CFA showed a very good model fit, $\chi^2(10) = 10.830$, $p = .371$; $CFI = 0.993$; $RSMEA = 0.027$.

Perceived Restrictions due to Forced Distance Teaching. To assess perceived restrictions due to technical conditions and online teaching, three items were created by the authors and used within the survey ('The implementation of online lessons puts me under pressure', 'I feel overwhelmed by the technical conditions', 'Online teaching as well as the technical conditions limit my scope of action'; $\alpha = .68$).

Teachers' Technical Equipment at Home. Due to the prevailing circumstances concerning COVID-19 and the resulting change to online instrumental music instruction, music teachers were asked to indicate how well they were technically equipped for online teaching at home. By that time in the pandemic it was unclear which technical conditions are necessary for qualitative teaching online. Therefore, only one self-developed item was used to measure the adequacy of technical equipment at home. Measurement with only one item has the disadvantage that reliability is limited. This must be considered when interpreting the data.

Table 1: Descriptive Statistics and t-Test

	Before COVID-19 ($N = 112$)			During distance teaching ($N = 112$)			t	p	Cohen's d
	M	SD	α	M	SD	α	Number of items		
Autonomous motivation	4.70	0.44	.69	4.24	0.74	.77	4	6.634	<.001	0.760
Controlled motivation	2.13	0.80	.80	2.10	0.80	.86	6	.468	.641	0.037
BPNS:										
Autonomy	4.43	0.69	.84	3.98	0.88	.75	3	5.245	<.001	0.560
Competence	4.45	0.55	.71	4.03	0.90	.76	2	5.678	<.001	0.566
Social relatedness	3.92	0.81	.70	2.95	1.30	.83	2	10.345	<.001	0.886
Good technical equipment				3.85	1.05		1			
Perceived restrictions				2.55	0.95	.68	3			

Scale: 1 (do not agree at all)–5 (agree very strongly). BPNS, satisfaction of basic psychological needs

6 Results

6.1 Descriptive Statistics

See Table 1 for the following descriptive statistics.

Motivational Regulation. Teachers in the period before COVID-19 retrospectively reported a higher degree of autonomous motivation (M = 4.70; SD = 0.44) than during enforced distance teaching (M = 4.24; SD = 0.74). A significant difference with a large effect size was found. Teachers' perception of controlled motivation remained at the same low level both before COVID-19 (M = 2.13; SD = 0.80) and during online teaching (M = 2.10; SD = 0.80).

PNS. Perceived satisfaction of basic needs – as rated retrospectively – was significantly higher before COVID-19 than during enforced distance teaching. However, differences can be observed in the size of the effects. Autonomy and competence showed medium effect sizes, whereas social relatedness showed a high effect size for the mean difference with respect to teaching before and during the COVID-19 crisis.

Furthermore, teachers assessed their technical equipment available at home for distance learning as relatively good (M = 3.85; SD = 1.05), but also perceived restrictions due to enforced distance teaching (M = 2.55, SD = 1.05).

6.2 Correlations

Table 2 provides an overview of the correlations between the main variables before and during the enforced shift to online instrumental music instruction.

Before COVID-19. Autonomous motivation showed the highest correlation with the need for competence (r = .47, p < .01). Low but significant correlations were found with regard to social relatedness (r = .29, p < .01) and autonomy (r = .23, p < .05). A negative correlation was found for age (r = -.28, p < .01). Thus, older teachers were less controlled in their motivation before enforced distance teaching and learning. With respect to the intercorrelations of the BPNS, it is noticeable that competence and relatedness correlated relatively highly with each other (r = .59, p < .01). Moreover, social relatedness is marginally but significantly associated with controlled motivation (r = .12, p < .05).

During enforced distance teaching. Needs for autonomy and competence correlated highest with autonomous motivation (r = .59 and .60, p < .01). Furthermore, good equipment (r = .27, p < .01) and perceived restrictions during online teaching (r = -.30, p < .01) predicted autonomous motivation during enforced distance teaching. Controlled motivation correlated weakly with social relatedness (r = .21, p < .05) and age (r = -.26, p < .01). Compared to the correlations before the shift to enforced distance teaching, it is noticeable that BPNS for autonomy correlated higher with the BPNS for competence

(r = .60**). In addition, good technical equipment at home and perceived restrictions due to enforced distance teaching correlated positively and negatively with BPNS, respectively (see Table 2).

Table 2: Correlations Among Measured Variables Before COVID-19 Restrictions and During Enforced Distance Teaching

	1	2	3	4	5	6	7	8
1. Autonomous motivation	—	-.06	.23*	.47**	.29**	-	-	-.07
2. Controlled motivation	**.18**	—	-.11	-.05	.12	-	-	-.28**
3. BPNS autonomy	**.59****	**.10**	—	.52**	.12	-	-	.21*
4. BPNS competence	**.60****	**.01**	**.60****	—	.19*	-	-	-.03
5. BPNS social relatedness	**.19***	**.21***	**.20***	**.25****	—	-	-	.01
6. Good technical equipment	**.27***	**.01**	**.25****	**.52****	**.09**	—	-	-
7. Perceived restrictions	**-.30****	**.17***	**-.37****	**-.46****	**-.19***	**-.49****	—	-
8. Age	**-.11**	**-.26***	**.00**	**-.08**	**.03**	**-.09**	**.15**	—

Note. *p < .05; **p < .01; correlations during enforced distance teaching are printed in bold. BPN = basic psychological need

6.3 Structural Equation Model

One aim of this study was to predict motivation during teaching in the online mode. For this purpose, structural equation modelling (SEM) was conducted (see figure 2). The SEM in figure 2 showed a mainly acceptable model fit, $\chi 2(214) = 300.496$, $p < .01$, $CFI = 0.91$, $RMSEA = 0.057$. The best predictor for autonomous motivation ($R^2 = .80$) was the BPNS for autonomy ($\beta = .84$, $p < .01$), followed by competence ($\beta = .12$, $p < .05$). It should be noted that these two predictors were highly correlated with each other and thus there is a clear indication of co-linearity. Perceived restrictions due to forced distance teaching ($R^2 = .02$) were predicted by the teacher's age ($\beta = .14$, $p < .05$). In turn, perceived restrictions predicted the BPNS for autonomy ($R^2 = .24$, $\beta = -.48$, $p < .01$) and competence ($R^2 = .41$, $\beta = -.64$, $p < .01$).

The model explained 16% of the variance in controlled motivation. The predictors of controlled motivation were age ($\beta = -.23$, $p < .01$), perceived restrictions ($\beta = .29$, $p < .01$), and social relatedness ($\beta = .21$, $p < .01$). The variable good technical equipment correlated with perceived restrictions due to online teaching ($r = -.49$, $p < .01$) and provided no additional explanatory value. Consequently, it was not included in the model.

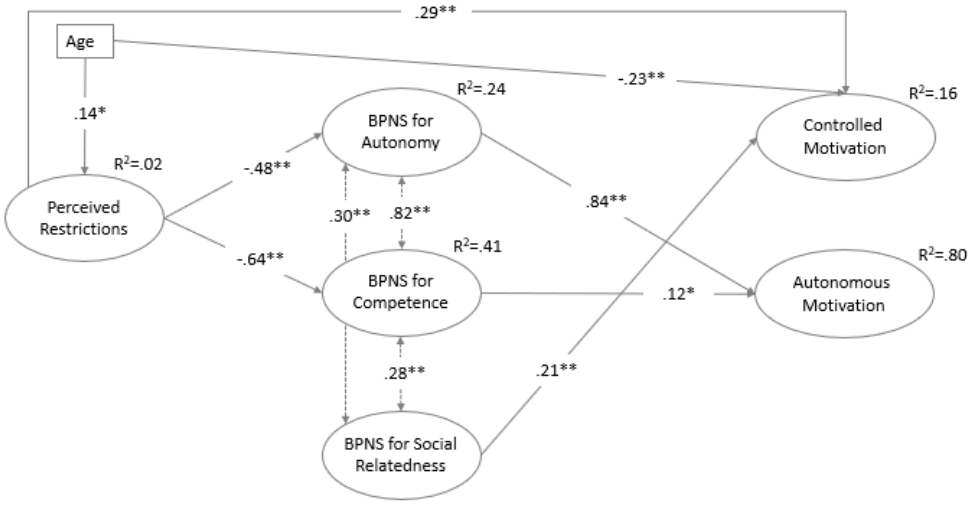

Figure 2 SEM: Teacher motivation during enforced distance teaching.
Note. Variables are modelled latently; measurement models are not shown; * $p < .05$, ** $p < .01$
Non-significant paths are not shown.

Comparing the SEM result with the SEM based on data of teachers' retrospective perceptions before the pandemic, we found that BPNS and teachers' age can explain motivation (see Fig. 3). The model fits are slightly worse for the second SEM and are outside the recommended cut offs ($\chi 2(154) = 230.086$, $p < .01$, $CFI = 0.863$, $RMSEA = 0.063$). The main difference is that before the transition to distance teaching competence ($\beta = .78$, $p < .01$) provides the highest predictive power for autonomous motivation ($R^2 = .80$). In contrast, no significant path coefficient was found between BPNS for autonomy and autonomous motivation. As with the first SEM, the BPNS for autonomy and competence are highly correlated, resulting in no additional explanatory effect of autonomy for autonomous motivation. Controlled motivation can also be explained ($R^2 = .14$) by age ($\beta = -.39$, $p < .01$) and social relatedness ($\beta = .20$, $p < .05$) before the pandemic.

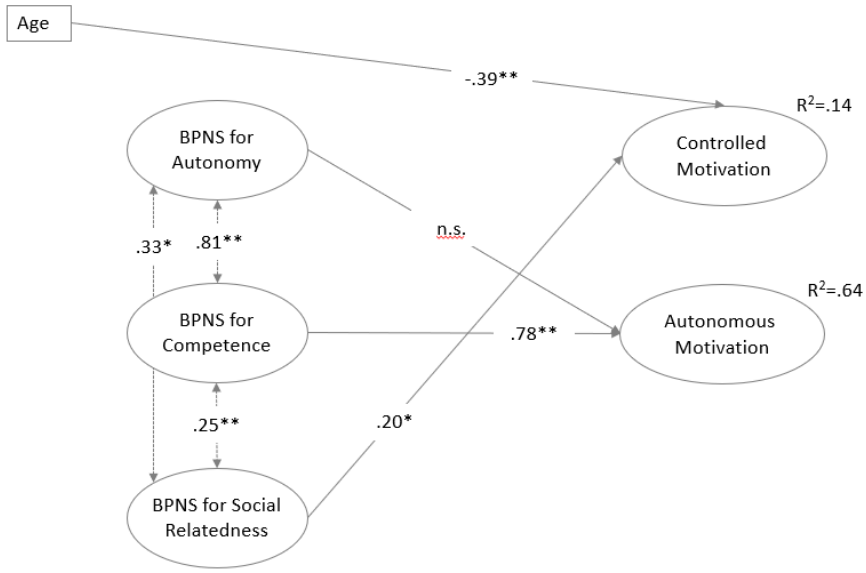

Figure 3: SEM: Teacher motivation before enforced distance teaching.
Note. Variables are modelled latently; measurement models are not shown; * $p < .05$, ** $p < .01$
Non-significant paths are not shown (except autonomy).

7 Summary and Discussion

The aim of the study was to investigate teachers' motivational regulation before and during enforced distance teaching in instrumental music instruction. In addition, the relevant conditions of motivation for distance learning were investigated.

As expected, autonomous motivation to teach was significantly lower than reported from a retrospective perspective before the pandemic (H1a). The relatively high effect size indicates that the enforced shift to online instrumental music instruction had negative consequences for teachers' autonomous motivation. However, compared to the retrospective perceptions, autonomous motivation remained at a relatively high level ($M = 4.24$ on a five-point scale). Nevertheless, the retrospective view may be confounded due to the overall low satisfaction during the pandemic. The second sub-hypothesis, which predicted significantly higher controlled motivation in enforced distance teaching, was not confirmed (H1b). Controlled forms of motivation apparently remained constant at a low level, which indicates that the overall quality of teachers' motivation remained quite high (cf. Vansteenkiste et al., 2009). One possible interpretation for controlled regulation remaining unchanged in the pandemic could be found in relatively stable personality traits

or abilities of self-regulation. There is empirical evidence that dispositional anxiety or general life stresses, for example, correlate moderately with controlled motivation in the teaching profession (Müller & Hanfstingl, 2018). However, further studies would need to corroborate the hypothesis that in the case of environmental changes (crises, etc.) controlled motivation is less affected, as relatively stable personal characteristics particularly determine controlled motivation. The extent to which controlled forms of motivation change among teachers after longer-enforced distance learning remains open and would also be an interesting further research topic. The second hypothesis (H2), which predicted lower BPNS than before the pandemic, was confirmed by significant mean differences for all three scales. In particular, social relatedness was rated significantly lower by teachers in enforced distance teaching. However, autonomy, which is associated with the feeling of being able to do what one really wants to, as well as competence, which goes along with experiencing personal efficacy, were assessed lower than before the pandemic. Again, teachers might have experienced less BPNS due to the overall low satisfaction during the pandemic; that could have influenced the teachers' retrospective and current perception. Furthermore, other studies have also found that teachers have lower motivation in enforced distance teaching than in a face-to-face environment (e. g. Kulikowski et al., 2021).

Due to the two-dimensionality of the motivational regulation scales for teachers, autonomous and controlled motivation were latently modelled as dependent variables in a structural equation model. In line with our expectations, autonomous motivation could be explained by the two basic psychological needs for autonomy and competence, whereas the high intercorrelation of these two needs strongly underestimated the predictive part of competence (first SEM) and autonomy (second SEM) respectively. The finding that satisfaction of relatedness did not predict autonomous motivation in enforced distance teaching during COVID-19 and before the pandemic was somewhat surprising. The correlation of relatedness with the other two basic psychological needs was weak, and collinearity is not a sufficient explanation for the fact that social relatedness has no explanatory effect on autonomous motivation. Our results corroborate the findings of other studies (Holzer et al., 2021; Martinek et al., 2021; Müller et al., 2021a), which also found little or no effects of relatedness on intrinsic motivation among university students during enforced distance learning. They argued that social relatedness does not necessarily affect internal psychological regulations. Online situations may well be experienced as highly self-determined (e. g. Ryan et al., 2006; Ryan et al., 2010). If the other two basic psychological needs for autonomy and competence are sufficiently satisfied, students may still be 'well aligned with their inner selves' (Martinek et al., 2021) and the need for relatedness may play a subordinate role. Another reason could be that the need for relatedness is not predominantly satisfied in the work context, but in the context of family or among friends and acquaintances (Tezci et al., 2015). These explanations are tentative, and future investigations should examine the role of relatedness for motivation over longer periods of (enforced) distance learning, not only in music education.

Moreover, in the structural equation model, controlled motivation could be explained less well than autonomous motivation. This phenomenon has been reported in other SDT-based studies (e. g. Vandenkerckhove et al., 2019). Surprisingly, social relatedness is a small but significant predictor of controlled motivation in both structural equation models ($\beta = .14/.20$, $p < .05$). This finding is not consistent with theory and is difficult to interpret. On the one hand, it cannot be ruled out that it is a chance discovery. On the other hand, it is conceivable that people feel they belong to a group and at the same time have not fully internalized the norms and values of the group. Thus, they could feel pressured internally, despite being socially integrated in the group. Of course, further research would have to be conducted to substantiate this assumption.

Additionally, results of the SEM showed that, age and perceived restrictions due to forced online teaching explained controlled motivation. Apparently, older teachers perceive themselves as less externally controlled than younger teachers. This age effect was also found in the retrospective assessments at the time before the pandemic (see fig. 3). A possible explanation might be greater life experience. Older teachers have learned to regulate themselves more independently of external influences. In this regard, Sheldon et al. (2006) refer to the concept of psychological autonomy. In this process, individuals gain the ability to make more self-appropriate decisions. Sheldon and Kasser (2001) found that older participants reported more goal autonomy compared to younger participants. Weman Josefsson and colleagues (2018) also showed in their study that the significant positive pathway between exercise, motivation, and psychological need satisfaction was stronger in older participants. However, this could also be a sample effect, since in the literature, and the findings on the correlation between age and controlled forms of motivation vary. Plausibly, there may be negative effects of perceived restrictions on the needs for autonomy and competence, and a direct path on controlled motivation.

8 Limitations

The study has limitations in relation to the sample composition and partly the quality of the instruments and the fit indices. The survey reached about a quarter of all teachers working in music schools in an Austrian state. This speaks for the high representativeness of the data, but does not completely exclude the effects of self-selective sample composition. It can be assumed that more intrinsically motivated and committed teachers participated in the study.

Due to pragmatic considerations, short scales had to be used in the study to measure motivational regulation and BPNS. Therefore, the reliability coefficients, compared to other factors, were partly lower (e. g. Autonomous Motivation -.69). Another limitation concerns the items used for measuring the restrictions due to enforced distance teaching. These items were developed by ourselves and did not run through a validation process.

Despite that, the reliability for this factor can be rated as acceptable (.68). Another limitation is the investigation of teachers' technical equipment at home with only one item. Future studies using this short scale should employ an extended item pool for competence and relatedness. Moreover, another limitation concerns the study design. Due to the circumstance, this study was composed with a cross-sectional design with a retrospective measure and a "current" measure of teachers' motivation. So, no real longitudinal data was used here. A not negligible limitation concerns the survey's retrospective measurement of teachers' motivation and need satisfaction before enforced distance teaching. Here, the retrospective assessment may be distorted. This common method bias may have an influence on the study's validity, reliability and correlation (Kock et al., 2021). A final limitation concerns the fit indices (especially in the second SEM), which are partly due to the relatively small sample and the measurement with short scales.

9 Further Research Directions

Future surveys could investigate whether motivational regulation and BPNS have since changed. It would be especially interesting to know whether motivation and BPNS recovered after the partial return to face-to-face teaching and whether there were interpersonal differences in development. In addition, the personal characteristics and which further environmental conditions lead to changes in motivation and BPNS among teachers should be investigated.

Moreover, it would be interesting to explore whether largely stable person-related variables, such as personality or self-direction skills, can additionally predict motivation, not only in distance learning (see above).

Furthermore, it would be interesting to find out whether, from the perspective of students and teachers, distance learning and teaching (at least partially) would be a viable option for teaching an instrument or whether this form of learning is completely dysfunctional for music schools.

10 Conclusion and Implications

The perception of autonomous motivation and BPNS of music teachers was substantially lower during enforced distance learning, whereas controlled motivation was rated the same. BPNS emerged as predictors of motivational regulation and the need for autonomy explained autonomous motivation best. The study also showed that older teachers, not just during the pandemic, exhibited less controlled motivation.

Teachers reported significantly lower relatedness in the online instrumental music lessons. This may be due to the switch to distance learning on the one hand and the general

restrictions in everyday life on the other. Another study with music students also showed, that the quality of contact between the teacher and students essentially suffered during learning an instrument in times of enforced distance instruction (Wieser & Müller, submitted; 2021).

From an emotional-motivational point of view, online instrumental music instruction is an emergency solution that had to be used in the pandemic. This is demonstrated by the findings of this study. Of course, there are also advantages in online teaching, such as time flexibility, which could have a positive impact on autonomy. However, especially in instrumental music instruction, the disadvantages outweigh the advantages.

The limitations of online instrumental music instruction can be seen, for example, in the limited social interaction, the time delay in transmission, and the lack of 'holistic' perception of the interaction partners. Additionally, Thielemann (2020) suggests that, especially, in simultaneous online music lessons and due to (the lack of) technical equipment, providing qualitative feedback does not work well. This is due to poor sound quality, unclear tone colours or phrasing, or difficulty in assessing posture. However, these factors are considered essential for quality teaching (Johnson, 2017).

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Declaration of Conflicting Interests

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

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