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Predictors of primary school teachers' self-efficacy beliefs for inclusive education

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Introduction: Teachers' self-efficacy is considered to be an essential personal resource which underlies the successful implementation of inclusion. The development of self-efficacy is supposedly linked to four main sources: Mastery and vicarious experiences, verbal persuasion, and physiological and affective states. Notwithstanding the importance of high self-efficacy beliefs, only few studies consider the impact of the individual sources on inclusion-related efficacy beliefs and thereby point out possible ways to promote teachers' self-efficacy.

Methods: Therefore, we investigated the effect of the assumed four sources on the basis of a sample of $N = 355$ teachers that work in 'inclusive' primary schools.

Results: Results from structural equation modeling highlight the importance of the supposed predictors of self-efficacy and in particular of teachers' own experiences. Self-efficacy in turn proved to be a significant predictor of teachers' willingness to implement inclusive education.

KEYWORDS

self-efficacy, inclusive education, primary school, teachers, professional competence

1 Introduction

The widespread ratification of the UN Convention on the Rights of Persons with Disabilities (CRPD; [United Nations, 2006](#)) obliges the signatory states to realize inclusion and thus to enable the equal participation of people with disabilities. Hence, the development of successful inclusive educational systems, which allow all students to actively participate, currently constitutes an international key challenge. In this context, the importance of teachers' personal resources, for example their self-efficacy beliefs concerning inclusive education, is often discussed. However, so far there is a lack of detailed investigations of teachers' self-efficacy and the associated four predictors – mastery experiences, vicarious experiences, verbal persuasion, and physiological and affective states. This research gap is therefore addressed within the present study.

2 Theoretical and empirical background

2.1 Inclusive education in Germany

The UN Convention on the Rights of Persons with Disabilities obliges the signatory states to 'ensure an inclusive education system at all levels' (Art. 24 CRPD). However, currently there

is no consensus on a definition of inclusive education (Haug, 2017; Sansour and Bernhard, 2018): ‘In spite of an overriding formal normative consensus, it is not possible to find one universally institutionalized definition of inclusive education’ (Haug, 2017, p. 207). A fundamental distinction can be made between a narrower and a broader understanding of inclusion (Haug, 2017; Sansour and Bernhard, 2018). Whereas the widespread narrow understanding of inclusion focuses on special education (e.g., Finkelstein et al., 2021; Haug, 2017; Sansour and Bernhard, 2018), in a broader definition, inclusion ‘concerns all students and marginalized groups’ (Haug, 2017, p. 209). In every case, following the goal of inclusion, school settings worldwide have to be modified in order to provide an environment that meets the needs of the individual students.

This reorientation, however, poses a particular challenge for the Federal Republic of Germany with its outstanding historical tradition of a highly differentiated school system (e.g., Sansour and Bernhard, 2018). In Germany, the UN Convention on the Rights of Persons with Disabilities was ratified in 2009. As a consequence, the *Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany* (2011) published a resolution, which contains recommendations for the joint education of all children and adolescents in regular schools. Despite the existence of these first binding guidelines for the realization of inclusion, the German educational system still maintains the strict dichotomy of both, regular schools and special schools (Klemm, 2018; Sansour and Bernhard, 2018). Furthermore, since Germany is a federal republic consisting of 16 federal states with sovereignty concerning legislation and administration in the field of education, there are considerable regional differences not only in terms of the school system and exclusion rates but also regarding the underlying concepts and assessments of special educational needs (Klemm, 2018; Sansour and Bernhard, 2018). Overall, in Germany inclusion is most widespread and implemented in primary schools, which are designed as community schools, whereas joint education is not yet very prevalent in secondary schools (e.g., Biewer, 2017).

Hence, the implementation of inclusive education (in Germany) goes along with changes of work activities of and demands on teaching staff. Teachers have to find ways to professionally deal with the increasing heterogeneity in the classroom (Peperkorn et al., 2020). Thus, for a successful school development toward inclusion, the availability of qualified teachers is emphasized as being especially important (Romi and Leyser, 2006).

Therefore, on a micro level the issue arises as to which prerequisites make some teachers more likely to take on the challenge of inclusion than others. Which competencies do these teachers need in order to be able to successfully meet the challenge of inclusion? In this regard, teachers’ personal resources, such as their attitudes, their self-efficacy beliefs, and their willingness to adapt classes according to the needs of the individual student are highlighted as especially important (e.g., Martínez, 2003; Romi and Leyser, 2006).

2.2 Teachers’ self-efficacy beliefs toward inclusive education

In this study, the focus is on the personal resource of teachers’ self-efficacy. Self-efficacy is defined as the confidence in one’s competences to achieve desired goals and cope with particular

challenges, even if the circumstances are demanding (Bandura, 1997). Self-efficacy is considered to be of great importance in predicting behavior (Bandura, 1997). It may therefore be assumed that teachers with higher self-efficacy expectations regarding inclusive education view themselves more capable to cope with the challenge of educating heterogeneous classes than teachers who possess lower self-efficacy. In this regard, Woodcock et al. (2022), who examined the relationship between self-efficacy beliefs and inclusive education practices of 41 Australian primary school teachers, highlight that while having similar conceptual understandings of inclusive education, teachers with high and low efficacy show rather different teaching practices. Posing a challenge to the goal of inclusion, low efficacious teachers focus for instance on the presence of support staff in the classroom and the categorization of students while high efficacious teachers apply a strength-based approach.

Thus, in order to be able to support the development of high self-efficacy beliefs for example in (advanced) teacher training, questions arise regarding the associated sources. Bandura (1997) assumes four different sources of self-efficacy. He sorts them in a descending order according to their assumed power: Mastery experiences, vicarious experiences, i.e., the observation of a significant other that performs a certain action, verbal persuasion, i.e., the expression of trust or doubt, and physiological and affective states. Yet, those different predictors “rarely operate separately and independently” (Bandura, 1997, p. 87), but “these influences affect one another” (Bandura, 1997, p. 88) leading to self-efficacy beliefs which are based on the cognitive processing of different interacting information. However, so far there are only few studies in which these predictors are specifically investigated (e.g., Franzen, 2021; Henson, 2002; Klassen et al., 2011). Cheung (2008) generally highlights a positive relationship between primary school teachers’ prior experiences and their respective teacher efficacy. In various studies, this positive relationship could be confirmed in the context of inclusive school settings, showing that experiences in inclusive education and self-efficacy beliefs to teach in inclusive schools and to implement inclusive practices are positively related (e.g., Leyser et al., 2011; Malinen et al., 2013; Soliman, 2020; Tümkaya and Miller, 2020; Yada et al., 2018). In this regard, previous teaching as well as contact experiences with children with special educational needs seem to have a positive effect on (student) teachers’ self-efficacy beliefs as well as on their willingness to work in inclusive settings (e.g., Forlin et al., 2010; Romi and Leyser, 2006; Wilson et al., 2020). In this context, Hellmich and Görel (2016) also highlight that primary school teachers with more extensive inclusive teaching experiences – operationalized as experiences in more than two special educational needs areas – show significantly more positive self-efficacy beliefs toward inclusive education than teachers with less or none prior experiences with school inclusion. In their study of Australian secondary school teachers, Subban et al. (2021) further state that those teachers with over 20 years of teaching experiences possess significantly higher self-efficacy beliefs than teachers with less than 5 years experiences. The authors also emphasize the special importance of the perceived degree of success in teaching students inclusively. Tschannen-Moran and Woolfolk Hoy (2007) found lower mean self-efficacy scores among novice than among career teachers, as well, whereas Dignath et al. (2022) in turn describe higher levels of self-efficacy among pre-service than among in-service teachers. Taliaferro (2010), who studied American physical education teachers’ self-efficacy beliefs to teach students with autism in inclusive settings, also

highlights the particular importance of the quality of one's experiences for the development of high self-efficacy beliefs. Thus, to develop positive self-efficacy beliefs in inclusive education, the interpretation of prior experiences is supposed to be of particular importance (Taliaferro, 2010). However, the conditions and the quality of teachers' experiences so far have received far too little (scientific) attention (Cloerkes, 2007).

Summarizing the previous study results, own experiences, and especially their perceived quality, emerge as key predictors of teachers' self-efficacy beliefs in inclusive teaching. In spite of the importance of teachers' self-efficacy beliefs outlined above, the three other assumed sources of self-efficacy beliefs toward inclusive education, i.e., vicarious experiences, verbal persuasion, and especially teachers' physiological and affective states, are still under-researched (e.g., Klassen et al., 2011; Morris et al., 2017; Taliaferro, 2010). Hagen et al. (1998), in one of the few existing studies to date, found that it is possible to increase pre-service teachers' self-efficacy beliefs to work with children who are considered 'difficult to teach' by vicarious experiences as well as by verbal persuasion. Alhumaid et al. (2020) highlight a positive effect of pre-service teachers' experiences in observing physical education teachers, who teach students with disability, on their respective self-efficacy beliefs. However, Taliaferro (2010) only found a significant unique contribution of mastery experiences, verbal persuasion, and physiological and affective states to the explanation of physical education teachers' self-efficacy beliefs to include students with autism, whereas vicarious experiences unsuspectedly did not make a significant independent contribution to the variance of teachers' efficacy beliefs. Investigating $N=261$ Japanese and $N=1,123$ Finnish teachers' sources of self-efficacy for inclusive practices, Yada et al. (2019) also note that mastery experiences represent the strongest of the four predictors that contributes uniquely to teachers' self-efficacy beliefs. In their study, verbal persuasion, however, also makes a smaller unique contribution to the explanation of self-efficacy. Finally, Oetjen et al. (2021), on the basis of interviews with $N=43$ primary school teachers, found out that the teachers regard social support, especially from colleagues, as a central resource in inclusive settings, as well. Accordingly, in a study of $N=148$ Scottish primary school teachers, Wilson et al. (2020) identified the perceived school climate as a significant predictor of teachers' self-efficacy beliefs. Tschannen-Moran and Woolfolk Hoy (2007) in turn found out that the support of colleagues and community proves to be especially important to explain the teacher self-efficacy of novice teachers who possess little mastery experience. In contrast, in their study there is little contribution of verbal persuasion to career teachers' self-efficacy beliefs.

Thus, the few previous studies concerning the four assumed predictors of teachers' self-efficacy beliefs toward inclusive education prove to be ambiguous in their results. Morris et al. (2017) further state a lack of studies, in which all the assumed predictors of teachers' self-efficacy beliefs are included in one model, which will lead to a more complete understanding of the sources of teachers' self-efficacy and their respective influence on teachers' behavior in the classroom.

Self-efficacy beliefs are further considered to have a high predictive value for future behavior (Bandura, 1997). In his 'Theory of Planned Behaviour', Ajzen (1991) identifies self-efficacy beliefs as a central predictor of intentions to act, along with attitudes and subjective norms. In accordance with Bandura's (1997) social cognitive theory and Ajzen's (1991) 'Theory of Planned Behaviour', several

studies lead to the conclusion that teachers' self-efficacy for inclusive education proves to be a significant predictor of their intentions to implement inclusion in schools (e.g., Hellmich et al., 2019; MacFarlane and Woolfson, 2013; Sharma et al., 2018; Sharma and Jacobs, 2016). Regarding this, teachers' willingness to inclusion apparently depends on children's type of disability, i.e., teachers are especially positive regarding the inclusion of children with physical disabilities and sensory impairments, whereas they are most negative about educating children with learning or cognitive disabilities as well as behavioral problems inclusively (de Boer et al., 2011).

2.3 Research hypotheses

Against the outlined theoretical and empirical background, the aim of our study is to investigate whether primary school teachers' self-efficacy beliefs toward inclusive education are significantly predicted by their mastery and vicarious experiences, their perceived verbal persuasion, and their physiological and affective states (Bandura, 1997). Following Bandura (1997) and prior research (e.g., Bosse and Spörer, 2014; Malinen et al., 2013; Taliaferro, 2010; Yada et al., 2019), we expect that primary school teachers' self-efficacy beliefs are significantly explained by these four predictors and especially by primary school teachers' mastery experiences:

H₁: Primary school teachers' self-efficacy beliefs concerning inclusive education are significantly predicted by their mastery and vicarious experiences, their perceived verbal persuasion, and their physiological and affective states.

Furthermore, in accordance with Bandura's (1997) assumptions of an action-guiding function of self-efficacy beliefs, Ajzen's (1991) 'Theory of Planned Behaviour', and the results of various studies (e.g., MacFarlane and Woolfson, 2013; Sharma and Jacobs, 2016; Taliaferro, 2010), we assume that primary school teachers' self-efficacy beliefs toward inclusive education constitute a significant predictor of their willingness to implement inclusive practices (H₂).

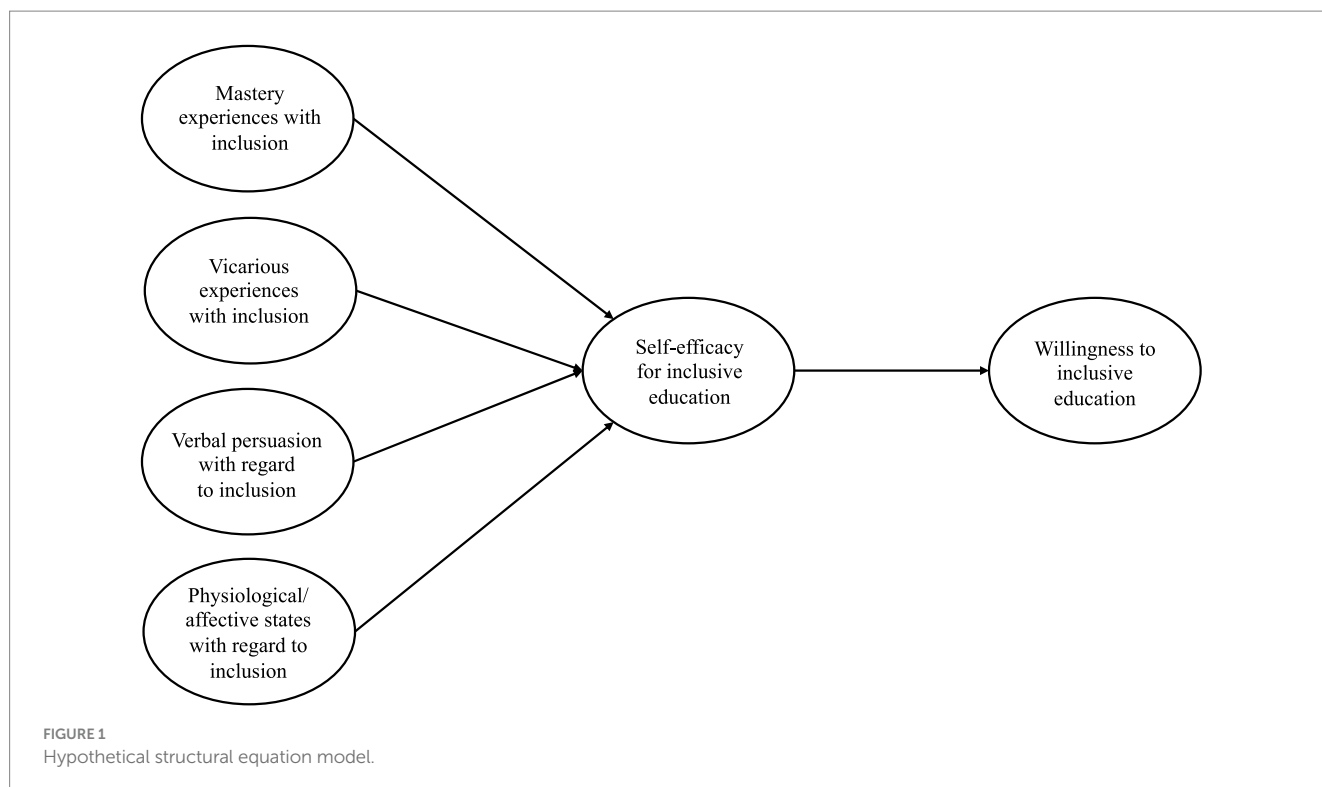
H₂: Primary school teachers' willingness to implement inclusive practices in schools is significantly predicted by their self-efficacy beliefs concerning inclusive education.

Hypotheses (H₁) and (H₂) are graphically displayed in a structural equation model (SEM) in Figure 1.

3 Method

3.1 Participants

In our study, a sample of $N=355$ German primary school teachers, who indicated that they work in inclusive schools, filled in a paper-pencil-questionnaire focusing on their self-efficacy beliefs regarding inclusive education. Those teachers answered in the affirmative to the question 'Is inclusion implemented at your school?' The average age of the participating teachers was 43 years ($M=43.01$ years, $SD=10.63$ years, $Min=23$ years, $Max=65$ years). Their teaching experiences ranged between less than one to 42 years with a mean of



16.01 years ($SD=10.29$ years) and, on average, the teachers had inclusive teaching experiences of about 8 years ($M=7.61$ years, $SD=6.64$ years, $Min=0$ years, $Max=35$ years). The participating teachers were predominately female ($N=309$; 87%). The majority of the participating teachers did not possess any special educational training or additional training ($N=309$; 87%). However, 28 of the teachers (7.9%) stated that they are trained in special needs education and 12 (3.4%) indicated that they possess additional training in special needs education. Six teachers (1.7%) did not answer the question concerning their education and training.

3.2 Measures

Based on the theoretical concept of self-efficacy (Bandura, 1997) and the current empirical research, we used a self-developed questionnaire to investigate primary school teachers' self-efficacy beliefs concerning inclusive education, their mastery and vicarious experiences with inclusion, their perceived verbal persuasion, their physiological and affective states, and their willingness to inclusive education (for the questionnaire see also Franzen, 2021). In line with a broad understanding of inclusion (c.f. Chapter 2.1), no distinction was made between certain types of disability, since the sole focus on pupils with special educational needs restricts the inclusion discourse to solely one facet of diversity. Instead, the questionnaire focuses on the inclusion of "all children." All scales required answers on five-point Likert scales (1 = 'Not at all true', 2 = 'Rather less true', 3 = 'I do not know', 4 = 'Rather true', 5 = 'Completely true'). Results from exploratory factor analysis showed that the different constructs could be distinguished from each other. Using principal component analysis and varimax rotation (Rammstedt, 2004) as well as confirmatory factor analysis ($\chi^2=879.53$, $df=390$, $p \leq 0.001$, $\chi^2/df=2.26$, $RMSEA=0.059$ (90%

$CI=[0.054; 0.065]$; $p_{close}=0.002$), $CFI=0.90$, $TLI=0.89$, $SRMR=0.064$, c.f. Table 1) with a fixed association of the items to certain factors (Bühner, 2011) to test for dimensionality, the assumptions regarding the dimensional structure of the captured constructs could be empirically confirmed. Thus, the presumption of internal construct validity is supported (e.g., Bühner, 2011; Rammstedt, 2004). In detail, the questionnaire contained the following questionnaire scales:

- Teachers' self-efficacy beliefs toward inclusive education: to assess primary school teachers' self-efficacy beliefs for inclusive education, we used an adapted 7-item questionnaire scale. This questionnaire scale was based on already existing instruments by Sharma et al. (2012) and Kopp (2009) (e.g., 'I am convinced to be able to organize classes in a way that all children can reach their goals at their own pace'; Kopp, 2009; $M=3.58$, $SD=0.70$, $\alpha=0.90$).
- Teachers' willingness to inclusive education: primary school teachers' willingness to inclusive education was measured by a 5-item questionnaire scale. This questionnaire scale was developed based on the work of Langner (2015), Sharma and Jacobs (2016), and Seifried and Heyl (2016) (e.g., 'I am willing to teach in an inclusive class'; Seifried and Heyl, 2016; $M=4.41$, $SD=0.57$, $\alpha=0.79$).
- Mastery experiences: the 3-item questionnaire scale to investigate primary school teachers' mastery experiences with inclusion focused on their perceived quality of experiences. The questionnaire items were developed on the basis of the work of Bosse and Spörer (2014) and Taliaferro (2010). For instance, the following item was utilized: 'I have made the experience that, in heterogeneous classes, I can provide appropriate learning opportunities for all children.' (cf. Taliaferro, 2010; $M=3.55$, $SD=0.74$, $\alpha=0.81$).

TABLE 1 Results of the confirmatory factor analysis.

Scale	Item	λ
Teachers' self-efficacy beliefs toward inclusive education	A	0.74
	B	0.78
	C	0.80
	D	0.70
	E	0.73
	F	0.65
	G	0.78
Teachers' willingness to inclusive education	A	0.71
	B	0.77
	C	0.63
	D	0.62
	E	0.63
Mastery experiences	A	0.69
	B	0.81
	C	0.83
Vicarious experiences	A	0.78
	B	0.85
	C	0.89
	D	0.82
	E	0.81
Verbal persuasion	A	0.70
	B	0.81
	C	0.68
	D	0.60
	E	0.84
Physiological and affective states	A	0.80
	B	0.69
	C	0.79
	D	0.59
	E	0.67

- Vicarious experiences: the questionnaire scale to investigate primary school teachers' vicarious experiences included five questionnaire items (e.g., 'I was able to observe other teachers that were confidently planning their inclusive classes'; $M=3.43$, $SD=0.90$, $\alpha=0.92$). Since there is a lack of research on teachers' inclusion-specific vicarious experiences, the questionnaire scale was self-developed. In terms of content, some of the items are oriented toward prior work of [Bosse and Spörer \(2014\)](#).
- Verbal persuasion: a self-developed 5-item questionnaire scale was used to assess the perceived verbal persuasion, which primary school teachers received by significant others (e.g., 'I have often heard that I can relate well to different children'; $M=3.98$, $SD=0.53$, $\alpha=0.84$).
- Physiological and affective states: a self-developed questionnaire scale was used to evaluate primary school teachers' physiological and affective states regarding inclusive education. This scale consists of five items, i.e., 'I am afraid of conducting inclusive

education.' ($M=3.66$, $SD=0.83$, $\alpha=0.83$). The development of the questionnaire scale was partially content-oriented on an article by [Block et al. \(2010\)](#) and the work of [Taliaferro \(2010\)](#).

In a previous study, our questionnaire scales – in a slightly modified form – were also used with teacher training students. In this study, the various factors could also be differentiated from each other and the scales had good reliabilities. [Table 1](#) shows the detailed results of the confirmatory factor analysis.

3.3 Procedure

The data for our study was collected from spring to winter 2019. The sample was randomly selected and primary school teachers were personally asked to participate in our study. Following detailed implementation instructions, the data collection was carried out by several research assistants. Thus, implementation objectivity was ensured. Furthermore, written information concerning the study aims was given to the participating teachers on the first page of the questionnaire. Data collection was anonymous and ethical approval of the project was obtained from the Ethics Committee of our university.

3.4 Statistical analyses

In order to evaluate the hypotheses and to explore the assumed relationships, initially intercorrelations between the latent variables were calculated. According to [Cohen \(1988\)](#), an $r=|0.10|$ corresponds to a small correlation, an $r=|0.30|$ to a medium correlation, and an $r=|0.50|$ to a strong correlation. Furthermore, the calculated intercorrelations serve in particular to check the data for possible multicollinearity ([Field, 2018](#); [Urban and Mayerl, 2014](#)). Multicollinearity “exists when there is a strong correlation between two or more predictors” ([Field, 2018](#), p. 401). Increasing multicollinearity for instance can lead to biased parameter estimates in structural equation modeling ([Field, 2018](#); [Urban and Mayerl, 2014](#)). A conceptual differentiation of the variables is then no longer possible ([Urban and Mayerl, 2014](#)). Basically, an $r=|0.80|$ is regarded as a critical value for increased multicollinearity, strong distortions can be assumed from a value of $r=|0.90|$ ([Field, 2018](#), p. 402; [Urban and Mayerl, 2014](#), p. 44).

Additionally, structural equation modeling was applied in Mplus 7.3 ([Muthén and Muthén, 1998–2012](#)). The MLR estimation algorithm was used to appreciate the model parameters because of its robustness against deviations from the multivariate normal distribution of the data ([Brown, 2006](#)). Furthermore, missing values in the data set were not imputed, but instead the full information maximum likelihood (FIML) estimation was applied. Thus, the parameter estimation rested on the data available on a casewise basis. Casewise likelihood functions were calculated, cumulated, and maximized over the total sample (e.g., [Enders, 2001, 2010](#)).

To evaluate the fit of the estimated model, various criteria were applied. Referring to the ratio of χ^2/df , a cut-off value of $\chi^2/df \leq 3.00$ was used to indicate a satisfactory fit ([Iacobucci, 2010](#)). Following [Schermelleh-Engel et al. \(2003\)](#), values of the Root Mean Square Error of Approximation (RMSEA) of ≤ 0.05 are regarded as a good fit, values

between 0.05 and 0.08 are considered to indicate adequate fit, whereas values between 0.08 and 0.10 are taken as an indication of a mediocre fit. An *RMSEA* value of >0.10 is considered as unacceptable. The Standardized Root Mean Square Residual (*SRMR*) should be as small as possible, too, with a value of $\leq .05$ indicating a good fit and a value of ≤ 0.10 indicating an acceptable fit (Schermelleh-Engel et al., 2003). Moreover, for a good model fit, the Comparative Fit Index (*CFI*) and the Tucker-Lewis-Index (*TLI*) should attain values of above 0.90 (Weiber and Mühlhaus, 2014). However, according to Dimitrov (2012), *CFI* and *TLI* values between 0.85 and 0.89 still indicate a mediocre model fit and only values below 0.85 are considered as unacceptable.

4 Results

Table 2 shows the descriptive statistics and the intercorrelations between the assessed variables.

These descriptive results indicate that the participating primary school teachers on average show neutral to moderately positive self-efficacy beliefs and a high willingness to inclusive education. They command neutral to moderately positive mastery and vicarious experiences as well as physiological and affective states. Furthermore, the participating primary school teachers indicate that they have received positive verbal persuasions regarding inclusive education. However, standard deviations between 0.53 and 0.90 show that the single participating primary school teachers differ significantly from each other.

Concerning the calculated intercorrelations, we initially found highly significant positive correlations between the four assumed sources of efficacy. Further highly significant positive correlations were found between primary school teachers' self-efficacy beliefs concerning inclusive education and the assumed four sources of self-efficacy on the one hand and between primary school teachers' self-efficacy beliefs and their willingness to inclusion on the other hand. These results are consistent with the gages of Bandura's self-efficacy theory (Bandura, 1997; see also Furtado Nina et al., 2016; Pajares et al., 2007). In detail, strong positive correlations were found between teachers' mastery experiences and their self-efficacy beliefs and also between teachers' vicarious experiences and their self-efficacy beliefs. Teachers' physiological and affective states and their self-efficacy beliefs are moderately to strongly correlated with each other, while

there is a significant medium correlation between the verbal persuasion perceived by the participating teachers and their self-efficacy beliefs as well as between teachers' self-efficacy beliefs and their willingness to inclusion. The calculated correlations do not exceed the critical value for increased multicollinearity of $r=|0.80|$ (Field, 2018; Urban and Mayerl, 2014).

In order to investigate hypotheses (H_1) and (H_2), a SEM was conducted in Mplus 7.3 (Muthén and Muthén, 1998–2012) which is displayed in Figure 2. In this model, primary school teachers' mastery and vicarious experiences, their perceived verbal persuasion and their physiological and affective states are assumed to be significant predictors of their self-efficacy beliefs concerning inclusive education. Additionally, primary school teachers' self-efficacy beliefs are supposed to have a predictive effect on their willingness to implement inclusive practices. In the depicted SEM, significant paths are shown as continuous lines, whereas non-significant paths are shown in dashed lines.

Structural equation modeling resulted in a model with adequate fits ($\chi^2=963.52$, $df=394$, $p\leq 0.001$, $\chi^2/df=2.45$, *RMSEA*=0.064 (90% *CI*=[0.059; 0.069]; $p_{close}=0.000$), *CFI*=0.88, *TLI*=0.87, *SRMR*=0.085). In detail, the ratio $\chi^2/df=2.45$ indicates a satisfactory fit (Iacobucci, 2010). The *RMSEA* value of 0.064 ($p_{close}=0.000$) is adequate (Schermelleh-Engel et al., 2003) and the *SRMR* of 0.085 can be considered as acceptable as well (Schermelleh-Engel et al., 2003). Finally, *CFI* and *TLI* values of 0.88 or 0.87 can be regarded as mediocre (Dimitrov, 2012).

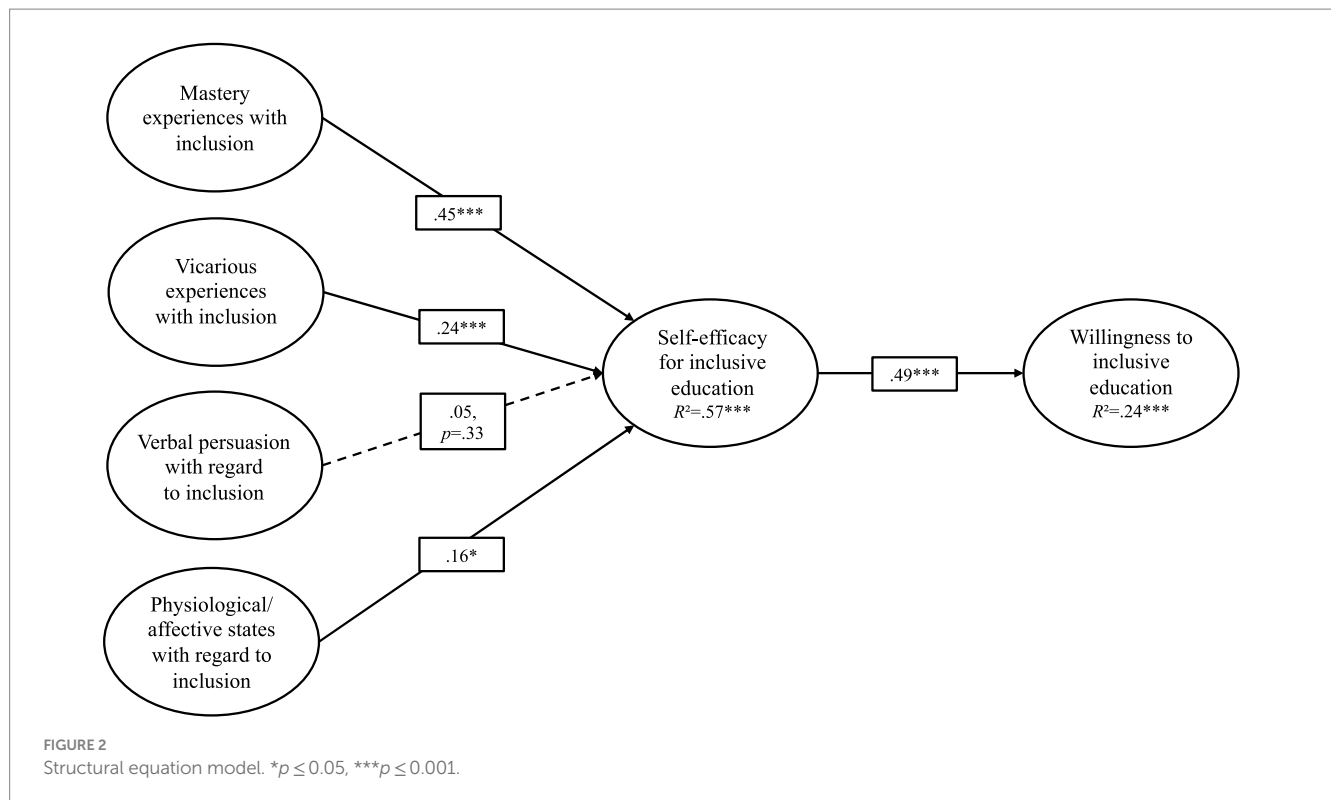
Supporting hypothesis (H_1), the results of the SEM indicate that primary school teachers' self-efficacy beliefs are significantly predicted by their mastery and their vicarious experiences as well as by their physiological and affective states with an explained variance of 57% ($R^2=0.57$, $p\leq 0.001$). Primary school teachers' mastery experiences turn out to be the most powerful predictor of their self-efficacy beliefs in inclusive education ($Beta=0.45$, $p\leq 0.001$). However, not supporting hypothesis (H_1), primary school teachers' self-efficacy beliefs concerning inclusive education are not significantly explained by their perceived verbal persuasion ($Beta=0.05$, $p=0.33$). That is, in the conducted structural equation model the perceived verbal persuasion does not emerge as a significant unique predictor of self-efficacy.

Supporting hypothesis (H_2), primary school teachers' willingness to inclusive education is significantly predicted by their self-efficacy beliefs concerning inclusive education with an explained variance of 24% ($R^2=0.24$, $p\leq 0.001$; $Beta=0.49$, $p\leq 0.001$).

TABLE 2 Descriptive statistics and intercorrelations of the latent variables.

		(1)	(2)	(3)	(4)	(5)	(6)
(1)	Mastery experiences ^a						
(2)	Vicarious experiences ^a	0.57***					
(3)	Verbal persuasion ^a	0.36***	0.20***				
(4)	Physiological and affective states ^a	0.48***	0.42***	0.33***			
(5)	Self-efficacy ^a	0.59***	0.54***	0.30***	0.47***		
(6)	Willingness ^a	0.41***	0.25***	0.34***	0.57***	0.38***	
<i>M</i>		3.55	3.43	3.98	3.66	3.58	4.41
<i>SD</i>		0.74	0.90	0.53	0.83	0.70	0.57
<i>Min</i>		1.33	1.00	2.00	1.20	1.14	2.00
<i>Max</i>		5.00	5.00	5.00	5.00	5.00	5.00

^a1 = Not at all true, 2 = Rather less true, 3 = I do not know, 4 = Rather true, 5 = Completely true, *** $p\leq 0.001$.



Controlling for gender and (special educational) training as covariates lead to another, only slightly different structural equation model with adequate fits ($N = 349$, $\chi^2 = 1068.34$, $df = 450$, $p \leq 0.001$, $\chi^2/df = 2.37$, $RMSEA = 0.063$ (90% CI = [0.058; 0.068]; $p_{close} = 0.000$), $CFI = 0.88$, $TLI = 0.86$, $SRMR = 0.087$). The results of this SEM indicate as well that primary school teachers' self-efficacy beliefs are significantly predicted by their mastery and their vicarious experiences as well as by their physiological and affective states with an explained variance of 57% ($R^2 = 0.57$, $p \leq 0.001$). Again, primary school teachers' mastery experiences turn out to be the most powerful predictor of their self-efficacy beliefs in inclusive education ($Beta = 0.47$, $p \leq 0.001$), with vicarious experiences ($Beta = 0.21$, $p \leq 0.01$) and physiological and affective states ($Beta = 0.15$, $p \leq 0.05$) still showing themselves to be significant unique predictors of self-efficacy. Likewise in this second model, primary school teachers' self-efficacy beliefs concerning inclusive education are not significantly explained by their perceived verbal persuasion ($Beta = 0.07$, $p = 0.23$). Primary school teachers' willingness to inclusive education in turn is still significantly predicted by their self-efficacy beliefs concerning inclusive education with an explained variance of 24% ($R^2 = 0.24$, $p \leq 0.001$; $Beta = 0.46$, $p \leq 0.001$).

5 Discussion

It was the aim of our study to investigate (1) whether primary school teachers' self-efficacy beliefs toward inclusive education can significantly be explained by the four assumed predictors of self-efficacy, i.e., by teachers' mastery and vicarious experiences, verbal persuasion, and physiological and affective states and (2) whether primary school teachers' self-efficacy toward inclusive education significantly predicts their willingness to implement inclusive

practices. In detail, we have assumed that especially the quality of teachers' experiences is of particular importance for the development of teachers' positive self-efficacy beliefs. To address these hypotheses, a sample of $N = 355$ German primary school teachers filled in a questionnaire regarding their self-efficacy toward inclusive education. The surveyed teachers showed neutral to moderately positive self-efficacy beliefs toward inclusive education and a high willingness to implement inclusive practices. Results of a structural equation model conducted in Mplus (Muthén and Muthén, 1998–2012) largely underline the importance of the assumed sources of efficacy and, as supposed, especially of teachers' mastery experiences to explain the variance of teachers' self-efficacy toward inclusive education. Our results hence match with Bandura's (1997) theoretical assumptions, who considered mastery experiences to be the most influential predictor of self-efficacy. The particular importance of own experiences is also in agreement with the results of several previous studies (e.g., Malinen et al., 2013; Taliaferro, 2010). However, it is a surprising result of our study that, unlike vicarious experiences and physiological and affective states, verbal persuasion did not turn out as a significant single predictor of primary school teachers' self-efficacy in inclusive education, despite being significantly correlated. This result is in contrast with both, Bandura's (1997) theoretical assumptions and the results of empirical findings by Hagen et al. (1998) and by Yada et al. (2019), see also Oetjen et al. (2021). It is possible that in this case, due to common explained variance between the different predictor variables, the independent explanatory contribution of verbal persuasion to the variance explanation of self-efficacy is reduced. Furthermore, possibly teachers' verbal persuasions take place rather situationally and are difficult to measure as general dispositions. The fact that verbal persuasions in the overall model do not make a significant independent contribution in explaining the

variance of self-efficacy can possibly also be explained by the existing experience of the surveyed teachers. All teachers work at inclusive schools. On average, they have been working in inclusive education for around 8 years and have an average of 16 years teaching experience. Therefore, the teachers already have many mastery experiences they can draw on to develop their self-efficacy. It can be assumed that the more own experience career teachers possess, the less significant is the role of verbal persuasions in the development of self-efficacy (Tschannen-Moran and Woolfolk Hoy, 2007). It could therefore prove interesting to test for differences in structural equation models to explain the inclusion-related self-efficacy of student teachers, teachers starting their careers and experienced teachers.

The findings of our study then again confirm the often-reported positive relationship between teachers' self-efficacy toward inclusive education and their willingness to work in inclusive classrooms (e.g., Bandura, 1997; Sharma and Jacobs, 2016). In detail, about one quarter of the variance of teachers' willingness to inclusive education can be explained by their according self-efficacy beliefs. Thus, while hypothesis (H₁) can only partly be confirmed with teachers' verbal persuasion not having a significant unique predictive impact on their efficacy beliefs, our results confirm hypothesis (H₂).

Bearing in mind the huge importance of teachers' positive self-efficacy beliefs for the implementation of high-quality inclusive learning environments (e.g., Woodcock et al., 2022), there is a need for (advanced) teacher training to optimally prepare (student) teachers for their tasks in inclusive education, and thereby to foster their self-efficacy. In order to be able to offer support and intervention measures, knowledge about the development of self-efficacy expectations is needed. Thus, the results of our study can offer first hints for (in-service) teachers' prospective training and development. However, our study hypotheses were examined on the basis of a cross-sectional study, which does not allow any statements about effects and causalities, but only regarding correlations between the examined constructs. In this respect, more in-depth longitudinal and intervention studies appear to be indispensable. For instance, it could be examined whether practical experiences during studies lead to an increase in prospective teachers' self-efficacy beliefs.

The study also does not contain any data about teachers' actual behavior in the classroom, but it is based on teachers' self-reported information. This may pose a risk of social desirability. Further observational studies in the classroom seem to be useful, which make it possible to determine a relationship between primary school teachers' self-efficacy beliefs toward inclusive education and their genuine teaching action. While this study only focuses on the four classic sources of self-efficacy named by Bandura (1997), for a more comprehensive understanding of self-efficacy, further exploratory studies could include other hypothesized predictors of self-efficacy in a model to explain teachers' self-efficacy toward inclusive education, such as contextual factors (i.e., the adequacy of resources for inclusive learning processes). Due to the underlying broad understanding of inclusion, this study for example did not differentiate between different types of disability. However, for example it could prove fruitful for future studies to include teachers' understanding of inclusion as a possible moderator variable, since different answers can be expected depending on teachers' underlying concepts (e.g., a broad and a narrower understanding). Finally, it also seems sensible to carry out the study with teachers working in other German types of school. While primary schools in Germany are basically designed as community schools and inclusion therefore

is implemented rather broadly, due to its vertical structure with different, coexisting types of school, the secondary school sector is still not prepared for the challenge of inclusion (e.g., Hollenbach-Biele and Klemm, 2020). Thus, in this context, significantly different results can be assumed.

In summary, the results of our study underline the importance of Bandura's four assumed sources for the development of positive self-efficacy beliefs toward inclusive education. In particular, it seems central to enable teachers to experience success in inclusive teaching and to promote these high-quality experiences, for example through counseling and guidance. Possible further support and intervention measures to foster the development of teachers' high self-efficacy beliefs toward inclusive education like regular teaching observations, which may allow for meaningful vicarious experiences, should also be investigated regarding their effectiveness within the framework of longitudinal intervention studies.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Ethics Committee of Paderborn University. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants' legal guardians/next of kin because the sample was randomly selected and primary school teachers were asked to voluntarily participate in the study. Written information concerning the study aims was given to the participating teachers on the first page of the paper-pencil-questionnaire. Subsequent participation was voluntary and data collection anonymous.

Author contributions

KF: Conceptualization, Funding acquisition, Writing – original draft, Writing – review & editing. BM: Writing – original draft, Writing – review & editing. FH: Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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