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Chinese version of the teachers' attitudes towards differentiated instruction scale: an adaptation study

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ABSTRACT

Due to the increasing heterogeneity of students within learning groups at school, teachers are urged to appropriately address students' learning needs by means of differentiated instruction. Given that the successful and effective implementation of differentiated instruction relies mostly on teachers, research has extensively explored teacher-related variables, such as attitudes, that have a strong impact on their use of differentiated instruction. However, empirical research exploring teachers' attitudes, specifically towards the practice of DI, is still quite limited. In addition, up to now, there is only one available instrument that assesses teachers' attitudes towards DI, the Teachers' Attitudes towards Differentiated Instructional Scale (TAT-DIS). In this context, the purpose of the present study is to report on the instrument's adaptation and implementation within the mainland Chinese context. The sample consisted of 650 primary and 702 secondary school teachers from western and central areas of China. Results of the confirmatory factor analysis confirmed the original two-factor structure: the value of DI and perceived insufficient resources. Regarding the internal consistencies of the subscales, the reliabilities of both subscales were good. Additionally, differences across the sociodemographic variables such as gender and school educational level were found. Limitations are discussed and future lines of research are recommended.

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Introduction

Worldwide, inclusive education is an extremely relevant topic of policy debate. In order to ensure inclusive quality education, policymakers and researchers urge teachers to adapt their instruction to the diverse learning needs of the students in their classrooms (UNESCO, 2017). Hence, teachers have been called to move away from a 'one-size-fits-all' approach and turn to the practice of differentiated instruction (DI). DI is an inclusive instructional practice that has been considered a core element of effective teaching (OECD, 2012), as it is grounded on the acknowledgment of students' learning differences (Smale-Jacobse et al., 2019; Suprayogi et al., 2017). Within the context of inclusive education, there is a sizeable body of empirical research that has reported on the predictive role of teachers' attitudes towards inclusive education and/or practices for their overall instructional behavior (e.g. De Boer et al., 2011; Delorey et al., 2020; Schwab, 2018), with far less published about teachers' attitudes specifically towards DI (Porta & Todd, 2022; Porta et al., 2022; Whitley et al., 2019). Evidence within the limited

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research available has shown that teachers' attitudes towards DI are closely related to their self-reported DI implementation (Letzel et al., 2020, 2022; Nicolae, 2014; Porta & Todd, 2022; Pozas et al., 2022; Whitley et al., 2019). Additionally, recent research exploring teachers' attitudes towards DI has shown that there is a complex interplay between the attitudinal domains of DI (Letzel et al., 2020, 2022; Pozas et al., 2022). Considering that attitudes are the results of 'a complex interplay of demographic and cultural factors' (Van Steen & Wilson, 2020, p. 11), research exploring teachers' attitudes towards DI in different cultural and educational contexts is essential. In this vein, the present study sets the spotlight on mainland China, where legislation and policies first began in the 1980s to develop an inclusive approach to education (Liu & Jiang, 2008). Given that the Chinese government has been promoting a more inclusive approach to education, teachers both in special and regular schools are responsible for implementing inclusive educational practices such as DI (Malinen et al., 2012). In this context, the paper reports on the adaptation and replication of the TAT-DIS among mainland Chinese teachers. This study furthermore explores whether teachers' attitudes towards DI are related to their demographic variables. The following section will briefly describe the key characteristics of the Chinese education system, and will then elaborate on the international literature and evidence concerning DI and teachers' attitudes towards DI.

Chinese education system

General characteristics of the Chinese educational system

There are four education levels in Chinese education system (OECD, 2021): (1) preschool education (3 years; for 3–5 year-old children); (2) basic education (a total of nine years), including primary education (six years; 6- to 12-year-old) and lower secondary education (three years; 13-to 15-year-old); (3) upper secondary education, with two options of formal and vocational high schools (three years; 16-to 18-year-old); and (4) tertiary education. Primary and lower secondary education comprise compulsory education for Chinese students (Fang et al., 2012). 15 Year-old students with lower academic performance are diverted to vocational high schools (Guo & Wang, 2020), and the current Chinese policy environment supports the development of vocational education (Jin et al., 2022; Shi, 2013).

The Compulsory Education Law guarantees student attendance, though its efficacy in achieving educational gains has been far from perfect in poor provinces or regions with insufficient resources (Fang et al., 2012). According to 2020 educational statistics (Ministry of Education of the People's Republic of China, 2021), the net enrollment rate of national primary schools was 99.96%, while the gross enrollment rate of lower secondary schools was 102.5%. However, nearly 53.6% of primary and secondary students are from rural areas (Ministry of Education of the People's Republic of China, 2021). Despite the fact that the Chinese government is working hard to get students to school, the overall quality of the learning environment could be improved (OECD, 2021). In 2020, the average class size in Chinese primary and lower secondary school class was 38 and 46, respectively (Ministry of Education of the People's Republic of China, 2021), which is high compared with OECD averages of 19 and 21, also respectively (OECD, 2021).

Regarding early childhood and special schools in China, the number of new schools has been increasing every year. Compared with 2019, the number of full-time kindergarten teachers nationwide increased by 5.4%, while the number of full-time teachers in special education has increased by 6.1% (Ministry of Education of the People's Republic of China, 2021). However, the number of private schools of all levels and types nationwide has been decreasing (Ministry of Education of the People's Republic of China, 2021). It is worth noting that some private schools in cities have poor educational quality and are usually small and located in suburbs (Wang, 2008). Migrant students and students who are low-performing are in the majority in those schools, since their families do not have the financial and social resources to get into other, more selective ones (Wang & Jang, 2016). Private schools are highly profitable businesses, which is contrary to the values of educational social equity (Wang & Jang, 2016).

Inclusive education in China

United Nations (UN) advocated that inclusion is an effective approach to educate all (UNESCO, 1990). This international inclusion campaign has influenced countries all over the world to inspire worldwide

education reforms towards providing equal education opportunity and appropriate pedagogy for students with different learning needs (Forlin & Lian, 2008). In this sense, the development of inclusive education in China is understood according to its cultural, economic, and political contexts.

In ancient China, Confucius proposed that teachers should teach all students, which has had a positive effect on Chinese educational reform and inclusive education. In addition to this cultural background, economic conditions play an essential role in prompting inclusive education. In the late 1970s, market-oriented economy reform and the open-door policy generated increasing economic growth and individual liberation, such as achieving equal rights for individuals with disabilities. The steady growth of the economy has inspired the Chinese government to develop a plan to achieve educational equity for all. Moreover, in the early 1980s, the Chinese government launched the revised Constitution and the Compulsory Education Law, which calls for students with disabilities to learn together with their peers in regular classrooms, which marks the beginning of its official concern with inclusion (McCabe, 2003; Xu et al., 2018). Since then, many Chinese policies and documents addressing infrastructural and financial investments in schools, such as Guidelines for Mid- and Long-Term Educational Reform and Development (2010–2020) and Trial Measures for Implementing Learning in Regular Classrooms for Children and Adolescents with Disabilities, have been promulgated to speed up the promotion of inclusion (Jia et al., 2022; Yan et al., 2021). Noticeably, inclusive education, also named Learning in Regular Classrooms (LRC), was reported as a key strategy for meeting the needs of students with special education requirements (Deng & Harris, 2008). Official Chinese documents did not contain the phrase ‘inclusive education’, however, until the plan of Special Education Improvement (2014–2016) which was issued in 2014. This plan enacted general, basic rules and steps for the further development of special schools and LRC in China.

Although the study by Tan et al. (2021) claimed that Chinese teachers embrace positive attitudes towards inclusion, several challenges and barriers have been identified in previous research (e.g., Xu et al., 2018). The first challenge concerns the Chinese education system itself, as it mainly emphasizes students’ academic achievement and are associated with teachers’ quality ratings (Deng & Pei, 2009). Therefore, some teachers argued that students with disabilities should be enrolled in special schools with more support and learning resources (Deng & Guo, 2007), because integrating them into general classrooms usually has an adverse influence on other students’ academic achievement (Jia & Santi, 2020). The second challenge is the average large class size and small number of students with disadvantages placed together with regular students (Fei, 2007; Jia & Santi, 2020). Due to limited energy, time, and ability, teachers are generally busy with regular students, so they may ignore or only pay little attention to students with disabilities; thus, providing paraprofessionals or teaching assistants, or otherwise offering support to mainstream teachers is necessary (Jia & Santi, 2020). Additionally, lacking the qualified teachers and professions who can offer students appropriate teaching methods and support in general classrooms is the third challenge (Xu et al., 2018). Teachers’ insufficient knowledge, experience, understanding, and skills affect their teaching adaptations for students (Jia & Santi, 2020; Poon-McBrayer, 2016; Yang, 2010). Lastly, the limited support system for inclusion should be improved, for instance by investing more in learning resources (Li & Li, 2020; Mu et al., 2015).

Teachers’ attitudes

Attitudes are conceptualized as a relatively stable subjective evaluation of certain subjects, objects or issues (Bizer et al., 2003), which comprise affective, cognitive and behavioral components (Maio & Haddock, 2010). As conceptualized within the social-psychological framework of planned behavior by Ajzen (1991), attitudes are assumed to strongly influence a person’s behavior and actions (Haddock & Maio, 2014). In recent years, there has been wide-ranging international research output showing a close link between teachers’ positive attitudes and their implementation of inclusive practices (Hellmich et al., 2019; Kopmann & Zeinz, 2016; Schwab, 2018). For example, in mainland China, research findings have shown that teachers’ attitudes towards inclusion are strongly associated with their implementation of inclusive practices (e.g., Qu, 2022; Sun, 2017).

Given the importance of teachers’ attitudes in their inclusive teaching behavior, several measurement instruments have been developed in order to assess attitudes towards inclusion (e.g., Cullen et al., 2010; Kunz et al., 2010; Seifried, 2015), attitudes towards student heterogeneity (Gebauer et al., 2013), attitudes

towards inclusive education (Loreman et al., 2007), and attitudes towards the instruction of children with SEN in mainstream classrooms (for an overview, see Kopmann & Zeinz, 2016). Nonetheless, given manifold measurement instruments, it is not surprising that the evidence concerning the link between teachers' attitudes and their implementation of inclusive practices (such as DI) is still largely mixed (e.g., De Boer et al., 2011; Hartwig & Schwabe, 2018; Ruberg & Porsch, 2017). In this context, Savolainen et al. (2020) argue that such mixed evidence could result from this lack of context-specific instruments focusing on the different sub-dimensions of teachers' attitudes, such as their attitudes towards DI.

In an attempt to fill this research gap within DI literature, Letzel et al. (2020) set out to develop, explore and validate an instrument aimed at specifically assessing teachers' attitudes towards their practice of DI. Following a sequential exploratory mixed-methods approach (Creswell, 2009), Letzel et al. (2020) established the TAT-DIS. Within the TAT-DIS validation study, results from a regression analysis revealed that, even after controlling for teachers' self-efficacy, their attitudes regarding DI appeared to be the dominant predictors of their DI practice (Letzel et al., 2020). Evidence also indicated that teachers who hold higher levels of value of DI and lower levels of perceived insufficient resources tend to differentiate their instruction more often. Similar results were also found by Pozas et al. (2022), who used the TAT-DIS within a small-scale study. Recently, Letzel et al. (2022) explored the interplay of the TAT-DIS domains, showing that teachers identify both the 'positive' and the 'negative' aspects of DI, and more importantly, they can recognize both attitude domains (value of DI and perceived insufficient resources) towards DI.

Teachers' sociodemographic variables and attitudes

Teachers' attitudes seem to be shaped by demographic factors (Dias & Cadime, 2016; Van Steen & Wilson, 2020). However, most of the research has yielded heterogeneous results (Vaz et al., 2015). Concerning age, some studies reported no significant effect of teachers' age on their inclusive attitudes (Avramidis & Norwich, 2002; Ellins & Porter, 2005) while others suggest that training in inclusive practices significantly fosters the attitudes of younger trainee teachers, but not older ones (Forlin et al., 2009). Following teaching experience, teachers with less experience have been shown to have a more positive attitude towards inclusion when compared with their more experienced counterparts (De Boer et al., 2011; Forlin, 1995; Liu et al., 2022). In contrast, a study by Dias and Cadime (2016) found no significant effect of teaching experience on teacher attitudes.

With regards to gender, previous studies addressing teachers' attitudes have shown significant differences (e.g., Avramidis & Norwich, 2002; Priyadarshini et al., 2017), indicating that gender is a significant factor related to how teachers perceive and adopt appropriate approaches in inclusive classrooms. For example, some studies have found that female teachers tend to have more positive attitudes towards inclusion than male teachers (Avramidis et al., 2000; Ellins & Porter, 2005; Leyser & Tappendorf, 2001; Opdal et al., 2001). However, other studies have reported the opposite. For instance, in a study exploring Saudi Arabian elementary school teachers, Alquraini (2012) found that male teachers reported more positive attitudes towards inclusion than female teachers. Similar results were also found by Sandhu (2017) in a sample of Indian teachers, as well as by Alghazo and Naggat Gaad (2004) in the United Arab Emirates. Findings by Yada and Savolainen (2017), who explored Japanese primary and secondary teacher attitudes towards the inclusion of students, showed no significant differences between male and female teachers.

School level, that is primary and secondary, has also been correlated to teachers' attitudes towards inclusion. On the one side, some studies have shown that secondary school teachers hold significantly higher levels of positive attitudes (Ellins & Porter, 2005); conversely, other studies such as those by Todorovic et al. (2011) and Bailey et al. (2015) report that primary teachers embrace more positive attitudes compared to secondary school teachers. Lastly, class size has also been considered to be a background variable that could influence teachers' attitudes towards inclusion (Avramidis & Norwich, 2002). However, research-based evidence on this issue has been mixed. For instance, Mpu and Adu (2021) as well as Alhassan and Abosi (2014) reported that a large class size is a barrier to inclusive education and limits teachers from using DI. In a more recent qualitative study by Porta and Todd (2022), findings indicate that class sizes impacted teachers' abilities to differentiate their instruction appropriately. Within the

Chinese context, a study by Jia and Santi (2020) revealed that teachers with large classes expressed that they do not have enough time and energy to address students' learning needs. However, studies by Monsen and Frederickson (2004) in New Zealand and by Hofman and Kilimo (2014) in Tanzania revealed no significant effect of class size.

Taken together, it can be assumed that teachers' attitudes are not only the result of a complex interplay of various demographic variables, but also cultural factors (Leyser & Tappendorf, 2001; Van Steen & Wilson, 2020). Results from Van Steen and Wilson (2020) meta-analysis show that, when taking into account teachers' demographic factors, the countries' context played an important role. Thus, exploring teachers' attitudes towards DI and their sociodemographic variables in different educational contexts is key (Letzel et al., 2020; Van Steen & Wilson, 2020).

The present study

Teachers play a key role in the successful implementation of DI (Hellmich et al., 2019; Savolainen et al., 2020), and their attitudes are decisive predictors of their DI practice (Schwab et al., 2019). Consequently, it is important to be able to measure such attitudes so that any barriers towards the successful implementation of DI and inclusive education policies can be identified and addressed (Ewing et al., 2018). In this vein, psychometrically sound instruments addressing teachers' context-specific attitudes, such as towards the practice of DI, are imperative (Antonak & Livneh, 2000). To the best of our knowledge, the only currently available instrument that considers the cognitive, affective, and behavioral components of attitudes towards the inclusive teaching practice of DI is the TAT-DIS (Letzel et al., 2020). Given that cultural background has been emphasized within studies of inclusive education (Savolainen et al., 2012; Van Steen & Wilson, 2020), it seems necessary to translate, adapt and standardize the TAT-DIS instrument in other countries and contexts. Hence, the present study was conducted in order to determine whether the two-factor structure presented by the original TAT-DIS (Letzel et al., 2020) could be replicated in a sample of Chinese primary and secondary teachers. Additionally, the present study analyzes differences in teachers' attitudes towards DI based on their sociodemographic variables. The research questions guiding this study are:

1. What is the internal structure of the Chinese version of TAT-DIS instrument among Chinese primary and secondary students?
2. Do participants' scores on the factors of value of DI and perceived insufficient resources vary in regards to their background variables (i.e. gender, teaching experience, school level or class size)?

Method

Participants and procedure

A total of 1,352 Chinese teachers from 46 primary and 54 secondary public schools (72% female) from two central provinces in China participated voluntarily in this study. For a full breakdown and description of the sample's demographic information, please refer to Table 1. Data collection was conducted during the school year of 2021–2022. The first author of the study contacted school principals to introduce the objective of this study and invited them to participate. School authorities who accepted the invitation then asked teachers to fill out a voluntary online survey, which took approximately 15–20 minutes.

Translation of the TAT-DIS questionnaire

The TAT-DIS was originally written in German and English, thus a Mandarin Chinese translation was required. The Chinese version of the TAT-DIS was established using the forward-backward translation procedure (Behling & Law, 2000) and followed three phases. The first author (Chinese as mother tongue and fluent in English) made the first translation, during which constant consultations and discussions with the second and third authors (with German and English as their mother tongues) were made.

Table 1. Participants' sociodemographic information.

Variables	<i>N</i>	%
Gender		
Male	381	28.2
Female	971	71.8
Age		
20–30 years	510	37.7
31–40 years	639	47.3
41–50 years	203	15.0
Educational level		
No degree	359	26.6
Bachelor's degree	872	64.5
Master's degree	121	8.9
Teaching experience		
0–5 years	328	24.3
6–10 years	383	28.3
11–15 years	353	26.1
16–20 years	236	17.5
More than 20 years	52	3.80
Class size		
21–30 students	94	7.0
31–40 students	416	30.8
41–50 students	649	48.0
51–60 students	193	14.3
School type		
Primary	650	48.1
Secondary	702	51.9

Secondly, two educational science professors gave their approval and one linguistic expert then did the final proofreading, and any changes were carefully discussed with the first author, until full agreement was achieved. The third and final phase of reviewing the translation was to give it to two other native Chinese experts in teacher education in order to translate the Mandarin Chinese version back into English. The two teacher education experts and the first author then compared both translations. Any discrepancies existing between Chinese and English versions were carefully discussed until consistency of translation was reached. Please refer to [Table 2](#) for the Chinese version of the TAT-DIS.

The TAT-DIS instrument

The TAT-DIS questionnaire (Letzel et al., 2020) comprises 8 items grouped into two subscales: Value of DI (VDI; five items) and Perceived Insufficient Resources (PIR; three items). The items are assessed by a Likert-type scale with five response anchors: (1) strongly disagree to (5) strongly agree. One of the items on the Value of DI scale uses reverse scoring so that its score has to be converted before the analysis. High scores on the Value of DI scale are an indicator of positive attitudes towards the practice of DI, whereas high scores on the PIR indicate negative attitudes.

Data analysis

The data were analyzed using SPSS 25 and MPLUS 7.3. First, the suitability of the sample data was tested by analyzing the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test of sphericity. Secondly, a CFA was applied to evaluate the structural validity of the TAT-DIS. A two-factor-correlated model, in which the two latent variables proposed by Letzel et al. (2020) was conducted. Factors with eigenvalues higher than 1 (Kaiser, 1960) as well as factor loadings above 0.4 were kept (Tabachnick et al., 2013). To compute the CFA's quality, the goodness-of-fit of the examined model was tested through different fit indices: (a) χ^2/df ratio, where a ratio ≤ 3 indicates a good fit (Byrne, 2004); (b) root mean square error of approximation (RMSEA), where a value ≤ 0.08 suggests a well-fitting model; (c) standardized root mean square residual (SRMR), with acceptable values considered as ≤ 0.08 (Hu & Bentler, 1999); and (d) comparative fit index (CFI) and Tucker-Lewis index (TLI), where values ≥ 0.9 demonstrate adequate fit (Bentler, 1990). The internal consistency of the obtained factors was verified by means of the Cronbach alpha's coefficient. In addition, one sample *t*-test will be conducted to examine Chinese teachers' Value of DI and Perceived Insufficient Resources. Lastly, *t*-tests and one-way analyses of variance (ANOVA)

Table 2. Chinese, German and English versions of the TAT-DJS.

TAT-DJS Chinese version	TAT-DJS German version (Letzel et al., 2020)	TAT-DJS English version (Letzel et al., 2020)
价值 我不知道为什么要在课堂中实施差异化教学	Nutzen Ich sehe wenig Anlass dazu, binnendifferenzierend zu unterrichten.	Value of DI I do not see a reason why I should differentiate my instruction.
差异化教学是教师教学任务的一部分	Differenzierung gehört zu den Aufgaben einer Lehrkraft.	Differentiated instruction is part of a teacher's task.
差异化教学有必要对全体学生进行实施	Binnendifferenzierung ist notwendig, um alle Schüler/-innen erreichen zu können.	Differentiated instruction is necessary to address all students.
我觉得非常有必要在课堂上进行差异化教学	Ich finde es notwendig, sich mit Binnendifferenzierung zu befassen.	I find it is necessary to engage myself with differentiated instruction.
我认为差异化教学是一种有积极寓意的教学方式	Für mich ist Binnendifferenzierung ein positiv besetzter Begriff.	I consider differentiated instruction a positive connoted term.
限制 我没有足够的时间能随时实施差异化教学	Kosten Ich habe nicht genug Zeit, um so oft binnendifferenziert zu unterrichten, wie ich es gerne möchte.	Insufficient resources I do not have enough time to differentiate my instruction as often as I want to.
如果我有更多的时间, 我会更常使用差异化教学	Wenn ich mehr Zeit hätte, würde ich öfter im Unterricht differenzieren.	If I had more time, I would differentiate my instruction more often.
为了节省更多的时间来准备差异化教学, 有必要减轻教师的教学负担。	Ein niedrigeres Deputat wäre nötig, um genug Zeit in eine binnendifferenzierte Unterrichtsvorbereitung investieren zu können.	A lower teaching load would be necessary in order to invest more time to prepare a differentiated lesson plan.

Table 3. Confirmatory factor analysis of items.

Item	Factor Loading	Factor 1	Factor 2	AVE	CR
Value of DI					
I do not see a reason why I should differentiate my instruction.*	0.859	1		0.721	0.928
Differentiated instruction is part of a teacher's task.	0.858	1			
Differentiated instruction is necessary to address all students.	0.853	1			
I find it is necessary to engage myself with differentiated instruction.	0.810	1			
I consider differentiated instruction a positive connoted term.	0.865	1			
Perceived insufficient resources					
I do not have enough time to differentiate my instruction as often as I want to.	0.879		2	0.773	0.911
If I had more time, I would differentiate my instruction more often.	0.889		2		
A lower teaching load would be necessary in order to invest more time to prepare a differentiated lesson plan.	0.869		2		

*Note: Reversed-coded item.

Table 4. Chinese and original versions of the TAT-DIS.

Variables	Chinese TAT-DIS			Original TAT-DIS (Letzel et al., 2020)		
	M	SD	α	M	SD	α
Value of DI	3.47	0.89	0.91	40.02	0.78	0.86
Perceived insufficient resources	3.91	0.75	0.89	40.27	0.87	0.76

were used to compare levels of Value of DI and Perceived Insufficient Resources across teachers' demographic variables: gender, school level, teaching experience, and class size.

Results

Factor structure and reliability

The KMO measure and Bartlett's test of sphericity demonstrated high strength in the relationships among items ($KMO = 0.88$; $\chi^2(28) = 6661.65$, $p \leq .001$) (Pallant, 2020), thus indicating appropriateness to perform a CFA. The two-factor correlated model yielded satisfactory goodness-of-fit indices ($\chi^2 = 24.17$, $df = 19$; $CFI = 0.99$; $TLI = 0.99$; $RMSEA = 0.11$; $SRMR = 0.01$). As observed in Table 3, all items' factor loadings were higher than 0.80, and thus over the >0.40 cutoff criteria established (Tabachnick et al., 2013). Moreover, both the composite reliability of Value of DI as well as of Perceived Insufficient Resources were above 0.70. Lastly, the average variance extracted for each of the two sub-scales exceeded 0.50.

Regarding reliability, the internal consistency of each the sub-scales were $\alpha_{VDI} = 0.91$ and $\alpha_{PIR} = 0.86$, indicating adequate reliability of this instrument. Table 4 presents the descriptive statistics of the TAT-DIS sub-scales as well as the scores obtained in the original study (Letzel et al., 2020). As the theoretical mean of the scales was 3, the teacher scores were significantly positive: total mean scores for Value of DI ($t(1351) = 19.38$, $p \leq .001$, Cohen's $d = 0.89$) and Perceived Insufficient Resources ($t(1351) = 46.84$, $p \leq .001$, Cohen's $d = 0.75$).

Differences between gender, school level, teaching experience, and class size

Regarding Value of DI, a t -test for independent groups revealed gender differences, with male teachers ($M = 3.69$, $SD = 0.86$) stating higher values than their female counterparts ($M = 3.38$, $SD = 0.88$), ($t(1350) = 5.84$, $p \leq .001$, Cohen's $d = 0.88$). Concerning Perceived Insufficient Resources, results indicate that male teachers ($M = 4.18$, $SD = 0.69$) state higher values than female teachers as well ($M = 3.86$, $SD = 0.75$), ($t(1350) = 7.04$, $p \leq .001$, Cohen's $d = 0.73$). For the case of school level differences, two t -tests for independent groups show that primary school teachers report higher levels (VDI: $M = 3.57$, $SD = 0.87$; PIR: $M = 4.03$, $SD = .73$) on both the Value of DI scale ($t(1350) = 3.94$, $p \leq 0.001$, Cohen's

$d=0.88$) and Perceived Insufficient Resources ($t(1350) = 3.93, p \leq .001$, Cohen's $d=0.74$), compared to secondary school teachers (VDI: $M=3.37, SD=0.89$; PIR: $M=3.87, SD=0.75$). Finally, two one-way ANOVAs exploring potential differences between teachers' attitudes and the teaching experience and class sizes revealed no significant group differences ($p \geq .05$)

Discussion

The purpose of the present study was to investigate mainland primary and secondary Chinese in-service teachers' attitudes towards DI by adapting the TAT-DIS instrument. Moreover, the study aimed to explore the relationship between teachers' attitudes towards DI and their demographic variables. The results from this study replicate the findings of the original German study (Letzel et al., 2020), that the TAT-DIS scale can be divided into two sub-scales, Value of DI and Perceived Insufficient Resources, and thus provides further support for the validity of the instrument. The Chinese TAT-DIS adaptation had good reliability, and the data adequately fit the anticipated two factor structure. Additionally, the results of the current study confirm that teachers' attitudes can be considered as a multidimensional concept (Savolainen et al., 2020). The current investigation and its findings also provide further support in the discussion regarding the complex interplay between teachers' attitudes in the context of inclusion. Such findings seem to be in line with evidence from a recent study by Letzel et al. (2022) which also revealed similar results, arguing that attitudes cannot be considered simple 'positive' or 'negative'. Moreover, the present study's results are also consistent with evidence from previous research concerning teachers' attitudes towards inclusion in China: Studies by Sun (2019) and Tan et al. (2021) have reported that Chinese teachers hold rather positive attitudes in general. However, Tan et al. (2021) argue that, considering certain features of the Chinese educational system (e.g. the coexistence of inclusive and special education systems, see Qu, 2021), it is quite possible that teachers also hold negative attitudes towards inclusion, such as reported by Liu et al. (2016) or Hu et al. (2017). This is clearly reflected within the present study's descriptive results. In detail, the findings reveal that Chinese teachers hold significantly high levels of both Value of DI and Perceived Insufficient Resources. In other words, Chinese teachers acknowledge the importance, relevance, and necessity of DI within their classroom teaching. Nevertheless, they also recognize a critical lack of resources (such as time constraints and teaching load), which inherently places severe challenges on their DI practice.

In the present study, female participants reported holding higher levels of Value of DI, whereas males perceive higher levels of insufficient resources. These results seem to be consistent with previous international research indicating that female teachers hold more positive attitudes towards inclusive schooling (De Boer et al., 2011; Schwab et al., 2021). Another interesting finding of this study was that, in comparison to secondary school teachers, Chinese primary school teachers hold significantly higher levels of Value of DI and Perceived Insufficient Resources. A possible explanation for these findings could be that, for instance, in comparison to secondary schools, Chinese primary schools have more students with SEN in their classrooms (Forlin et al., 2014). Moreover, Chinese secondary schools follow a tracking system according to performance (Stella et al., 2007). It could thus be possible that Chinese primary school teachers see the need to implement DI and are recognizing the value of it, but also are confronted with a highly diverse classroom and with a lack of resources to address the needs of their learner variance (Leung & Mak, 2010). Lastly, no significant effects were found for teaching experience or class size. In the case of teaching experience, research has yielded mixed results. In contrast, class size has been considered an important variable influencing teachers' attitudes towards inclusion. The present results must therefore be considered with caution, and further research following a mixed-methods approach (collecting both qualitative and quantitative data) could provide deeper insights.

Considering that there is still a limited number of studies in China that examine teachers' attitudes towards DI, much less the sub-dimensions of their attitudes towards DI, this study serves as a first attempt to provide future understanding in this direction. In addition, the findings within this study also provide information on Chinese in-service teachers. Keeping in mind that professional development can help shape a teacher's attitudes (Schwab et al., 2021), researchers argue that in-service teachers should be provided with support and training regarding knowledge and skills on inclusive education (Dack, 2019), and in particular, skills for collaborating with other teachers (Fu et al., 2023). More importantly,

given that attitudes have been found to be crucial in implementing high-quality inclusive education (e.g. Hellmich et al., 2019), and that teachers' attitudes are rather stable traits (Bosse et al., 2016; Savolainen et al., 2020), the current study's findings call for the need to foster positive attitudes towards DI in pre-service teachers by: (1) investing in providing pre-service teachers with opportunities, after their initial training with different modules or programs that offer a chance to gain mastery experiences of planning, implementing, and evaluating DI; and (2) offering student teachers with collaboration situations with in-service teachers, such as through teaching internships in inclusive education settings (e.g. Malinen et al., 2012; Schwab et al., 2017).

Limitations

It should be noted that this study has several limitations. Firstly, the research methodology is based mainly on teachers' self-reports. Consequently, such responses can be sensitive to overestimation, underestimation, or social desirability. Additionally, the data was collected through the use of a translated questionnaire. Although the questionnaire went through a rigorous translation and reviewing process, it is still possible that some items in the Chinese scales did not capture the essence of the original German and English language versions. Therefore, the present study calls for further replication studies using the Chinese version of the TAT-DIS. Second, the data collected is limited to primary and secondary school teachers in central and western areas of China. Given the economic development disparities (Qi et al., 2013) and differences found in these educational systems (Hong Kong and mainland China, to cite one extreme example) (Malinen et al., 2012), variations across different states, cultures, and schools can be expected.

Third, the results were based solely on cross-sectional analysis; inferences about teachers' attitudes towards DI must be made with caution. Additionally, recent results from Savolainen et al. (2020) have revealed that teacher self-efficacy is a predictor of attitudes towards inclusive education. In this context, the relationships between the variables of teachers' self-efficacy should be carefully and thoroughly explored (Wray et al., 2022; Yada et al., 2022). Lastly, the analysis of the psychometric properties from the mainland Chinese version of the TAT-DIS showed that the psychometric quality criteria for reliability were satisfactory. However, given that attitudes tend to differ significantly across cultures (Cullen et al., 2010), and thus may carry different meanings in different contexts, it seems necessary to examine possible measurement invariance for Chinese teachers (e.g. Braksiek, 2022).

Conclusions

Considering the importance of teachers' attitudes toward their instructional practice, the present study contributes to building a more detailed understanding of teachers' perceptions regarding DI as well as informing teacher development and teachers training for pre-service teachers. Additionally, the study's findings indicate that the TAT-DIS structure can also be replicated in other cultural and educational contexts. This opens the door for potential future international comparison research that could explore potential differences across countries and help generate a more comprehensive understanding of the key variable of teacher attitudes (Lee et al., 2015). Finally, to conclude, the study highlights the importance of further research assessing teachers' attitudes towards DI with the same instruments, in order to obtain comparable data and results that can clarify the current large body of mixed evidence.

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