



Development and validation of the empathy scale for teachers (EST)

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ABSTRACT

Empathy among teaching professionals is highly valued in the field of education. However, there is no suitable instrument to measure teachers' empathy in relation to their pupils. This paper describes the development and validation of an empathy scale for teachers (EST). The initial pool of items for the EST was generated by an open-ended survey of teachers. Exploratory and confirmatory factor analyses were employed to identify and confirm, respectively, the factor structure of the EST. The results show that the EST includes three dimensions: cognitive empathy, negative affective empathy and positive affective empathy, and the internal consistency reliability of the three subscales is satisfactory. In addition, the EST is positively correlated with perspective taking, empathic concern, prosocial behaviour and teacher-student relationships. Our study suggests that the EST could be an effective tool to measure the empathy of primary, middle and high school teachers in relation to their pupils.

1. Introduction

Empathy is a common interpersonal phenomenon in human society and has attracted substantial research interest in various branches of psychology (for a review, see Decety & Jackson, 2004). Accumulating evidence shows that empathy is fundamental to the development and maintenance of close interpersonal relationships (e.g., Coutinho, Silva, & Decety, 2014) and an important motivational resource for prosocial behaviour (for a review, see Eisenberg, 2000).

In the field of education, empathy has been broadly emphasized in teacher-student interpersonal exchanges (Boyer, 2010; Parsons & Brown, 2001; Rogers & Webb, 1991; William, 1999). Today's teachers not only teach but also establish learning-friendly environments and promote overall student development. This fact is acknowledged in the curriculum reform occurring in China, which explicitly proposes that teachers concern themselves regarding not only students' knowledge and ability but also their affects, attitudes and values (Huang, 2004). In practice, expressing this concern might require taking the perspective of pupils, adopting their point of view, developing an uncritical understanding of their inner thoughts and feelings, and treating them in a warm, caring manner. That is, teachers should be empathic. Empathy is

believed to be a key factor distinguishing excellent teachers from their non-excellent peers, and the ability to empathize with students is an essential part of effective teaching and learning (Nieto, 2006). Specifically, empathic teachers have been shown to be more successful in playing various professional roles (Stojiljković, Djigić, & Zlatković, 2012) and establishing productive teacher-student relationships (Narinasamy & Hasmah, 2013). Furthermore, empathic communication between teachers and students contributes to a supportive learning environment (Cooper, 2010), and teachers who understand their pupils are more likely to make lessons appealing (McAllister & Irvine, 2002), all of which could improve student learning motivation and outcomes (Bozkurt & Ozden, 2010). It has also been suggested that teacher empathy has a positive impact on students' self-efficacy (Cooper, 2004) and peer relationships (Schutz & DeCuir, 2002) and reduces violent behaviour (Ikiz, 2009).

Given the importance of teacher empathy in the field of education, a reliable and valid measurement instrument is necessary to gain an in-depth understanding of the nature and development of this professional trait. Over the past few decades, researchers have developed many empathy measurement instruments (Baron-Cohen & Wheelwright, 2004; Davis, 1983; Hogan, 1969; Jolliffe & Farrington, 2006;

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Mehrabian, Epstein, & Angles, 1972; Reniers, Corcoran, Drake, Shryane, & Völlm, 2011; Spreng, McKinnon, Mar, & Levine, 2009), several of which have also been used to investigate teacher empathy (Bostic, 2014; Huang, Li, Sun, Chen, & Davis, 2012; Tettegah & Anderson, 2007). However, most such instruments were developed in the general population and thus are not specifically designed for teachers or tied to educational situations. Studies using general empathy scales essentially assess empathy as a personality trait of the individual teacher and reflect teachers' general tendency to empathize with random others (Warren, 2015).

Previous studies have suggested that empathy is highly context dependent; the relationship between the empathizer and target is one of the main modulatory factors of empathy (De Vignemont & Singer, 2006). Teachers' empathy for pupils in their professional work may differ from their empathy for random others. In particular, teachers, as members of a helping profession, often recognize that students' development is the teacher's responsibility, which would prompt them to learn and care about students' thoughts and feelings (Nieto, 2006). That is, teachers may have considerable motivation to empathize with their pupils. There are, however, factors that prevent teachers from doing so. For example, the teaching profession is highly emotionally demanding, and empathy fatigue commonly arises from dealing with pupils (Wróbel, 2013). In addition, teachers and their pupils usually have a large age gap and grow up in different eras; this is especially true in China and could make it difficult for teachers to take the perspectives of their pupils (Batson, Lishner, Cook, & Sawyer, 2005). These factors imply that the measurement of teacher empathy should be specific to the educational situation to increase its explanatory and predictive value.

Therefore, the main purpose of this paper was to develop and validate an empathy scale specifically for teachers tied to specific educational situations that can be used to measure teachers' empathy in relation to their pupils in professional teaching. Such an instrument could provide insights into the development patterns of teacher empathy and promote empirical research on teacher empathy.

2. Literature review

2.1. Concept of teacher empathy

Empathy has been discussed in the field of psychology for nearly a century, with numerous and varied definitions (for a review, see Cuff, Brown, Taylor, & Howat, 2014). Currently, empathy is generally defined as an ability to understand and share other people's emotional states (Cuff et al., 2014; Decety & Jackson, 2004), and thus is a concept clearly distinct from other related concepts (e.g., perspective taking, theory of mind). In many studies, empathy is used interchangeably with perspective taking and theory of mind. However, in fact, these concepts are distinct. Perspective taking involves placing oneself in another person's position and adopting that person's point of view, which is one but not the only way to achieve empathy. There are also other ways, such as reading facial expressions, that can create empathy (Cuff et al., 2014). Theory of mind involves the attribution of the mental state of another person, including desires, beliefs, and intentions (Völlm et al., 2006), while empathy is specifically concerned with the attribution of emotions. Empathy is also often confused with sympathy. Although both are emotional responses derived from perceiving another person's emotions (Clark, 2010; Eisenberg & Fabes, 1990), empathy emphasizes that the observer generates the same or similar emotions as the observed emotions, while sympathy involves feeling concerned and sorrowing about others' misfortune or pain.

In this paper, teacher empathy is defined as the ability of teachers to understand and share students' emotional states in the educational context, in which the teacher is the empathizer and the student is the empathized. Teacher empathy involves only the attribution of students' emotions and not other mental states, and it does not include a feeling of pity for the pupil's pain and misfortune.

2.2. Structure of empathy

Early on, empathy was considered a one-dimensional structure and conceived of in terms of the cognitive or the affective approach. The cognitive approach defined empathy as the ability to judge and understand another person's mental state or states and emphasized the role of cognitive processing in empathy (Hogan, 1969). In contrast, the affective approach regarded emotional experience as the core of empathy and defined empathy as a matching or appropriate emotional response to the affective state of another (Mehrabian et al., 1972).

Later, many researchers in the field agreed that empathy is a multidimensional structure, and most researchers recognize both cognitive and affective components of empathy. Cognitive empathy refers to the ability to understand another person's emotional state, while affective empathy refers to the ability to vicariously experience or share another person's emotional state (Baron-Cohen & Wheelwright, 2004; Cohen & Strayer, 1996; Davis, 1983; Preston & de Waal, 2002). The two-dimensional theory of empathy is supported by empirical studies. For example, empathy studies have found that people with autism have cognitive-empathy deficits but normal levels of affective empathy (Baron-Cohen & Wheelwright, 2004). However, psychopaths present the opposite profile (Blair, 2005). Neurological studies have also demonstrated that the cognitive and emotional components of empathy reflect independent processes and are governed by separate brain systems (Shamay-Tsoory, Aharon-Peretz, & Perry, 2009; Zaki, Weber, Bolger, & Ochsner, 2009). In educational practice, identifying and understanding students' feelings from their point of view and placing oneself in the student's position to experience the student's feelings is an essential component of every teacher's professional work. The cognitive and affective components of empathy have also been recognized in research on teacher empathy (Stojiljković et al., 2012; Tettegah & Anderson, 2007).

Certain studies have suggested that empathy also includes a behavioural component (Geer, Estupinan, & Manguno-Mire, 2000; Oliveira-Silva & Gonçalves, 2011). Researchers have identified teachers' helping and caring behaviours towards students as belonging within the scope of teacher empathy (Bouton, 2014). However, others have argued there is no necessary connection between empathy and behavioural outcome (Cuff et al., 2014). Although empathy is often followed by a behavioural response, this is not always the case. In addition, other studies suggest that empathy per se does not directly lead to behavioural outcomes but must be transformed into sympathy to motivate helping (De Vignemont & Singer, 2006; Lishner, Batson, & Huss, 2011). Furthermore, helping behaviours have been found to precede empathy (Pithers, 1999). These lines of evidence suggest that empathy may be an important motivation for prosocial behaviour but does not have a behavioural component itself.

Therefore, we use the cognitive-affective component model of empathy as the theoretical framework of the newly developed empathy scale for teachers in this study.

2.3. Measurement of empathy

Over the years, several empathy scales have been developed, among which the Hogan Empathy Scale (HES; Hogan, 1969), Balanced Emotional Empathy Scale (BEES; Mehrabian et al., 1972), Interpersonal Reactivity Index (IRI; Davis, 1983), Empathy Quotient (EQ; Baron-Cohen & Wheelwright, 2004), and Toronto Empathy Questionnaire (TEQ; Spreng et al., 2009) are the most commonly used.² Below, we

² There are other empathy scales developed to target specific populations, such as the Jefferson Scale of Physician Empathy, the Nursing Empathy Scale, and Adolescent Measure of Empathy and Sympathy. Since these instruments were designed for use with specific groups, they are not covered in detail in this paper.

provide an overview of empirical studies that have explored the assessment of empathy and its limitations.

The Hogan (1969) and Mehrabian et al. (1972) view empathy as a one-dimensional structure. Specifically, the Hogan (1969) follows the cognitive theory of empathy and defines empathy as "an intellectual or imagined understanding of the state or mental state of others". The items of the HES were chosen from a larger item pool according to their ability to discriminate between previously categorized high- and low-empathy groups. A factor analysis suggested that HES includes four factors: social self-confidence, even-temperedness, sensitivity, and nonconformity (Johnson, Cheek, & Smither, 1983). However, studies have suggested that four factors of HES are better suited to the measurement of social skills than of a central tendency towards empathy (Baron-Cohen & Wheelwright, 2004; Davis, 1983). Following another theoretical path, the Mehrabian et al. (1972) emphasizes the emotional nature of empathy and defines empathy as "a vicarious emotional response to the perceived emotion of others" (Mehrabian et al., 1972). The items of BEES were selected from a larger pool by factor analysis. The definition of empathy used for the BEES appears to fit well with the current definition of affective empathy; however, an investigation of the items found that this scale does not measure emotional empathy but rather emotional arousability to the environment in general (Mehrabian, Young, & Sato, 1988).

The Davis (1983) and Baron-Cohen and Wheelwright (2004) follow the two-dimensional theoretical framework of empathy. Specifically, the Davis (1983) defines empathy as "the reactions of one individual to the observed experiences of another". The items of IRI were designed to measure either cognitive aspects of empathy, such as the ability to adopt different perspectives, or emotional aspects of empathy, such as the emotional responses to the observed emotional experiences of others. A factor analysis revealed the IRI consists of four major factors: perspective taking, fantasy, empathy concern and personal distress. The perspective-taking and fantasy subscales measure cognitive empathy, and the empathy concern and personal distress subscales measure affective empathy (Davis, 1983). Although the IRI is widely used, it has received criticism due to its broad definition. Researchers have argued that the fantasy and personal distress subscales measure the abilities of imagination or emotional self-control rather than empathy (Baron-Cohen & Wheelwright, 2004); the perspective-taking subscale measures the broad ability to adopt another's perspective, including thoughts, desires, beliefs, and intentions, not only emotion; and the empathy concern subscale is much more closely aligned with sympathy than empathy (Jolliffe & Farrington, 2006). The Baron-Cohen and Wheelwright (2004) defines empathy as "the drive or ability to attribute mental states to another person/animal, and entails an appropriate affective response in the observer to the other person's mental state". The EQ comprises 60 items, of which 40 items address empathy and 20 items are filler items. A factor analysis revealed that the EQ consists of three factors: cognitive empathy, emotional reactivity and social skill. However, in the EQ, cognitive empathy overlaps with theory of mind, and sympathy is regarded as a form of affective empathy (Baron-Cohen & Wheelwright, 2004).

The TEQ was developed to address the heterogeneity of the aforementioned empathy measurement tools that involve different conceptions and attempts to formulate a consensus on empathy (Spreng et al., 2009). Rather than treating empathy as a single structure, the Spreng et al. (2009) seeks to extract a single-factor representation of the currently heterogeneous empathy construct to create a useful tool for empathy research. They first collected items from several published self-report empathy measures. Then, using exploratory factor analysis, they forced the items to load onto a single factor, thereby assembling a group of highly related items across many measures of empathic response. Finally, they obtained a 16-item scale with satisfactory reliability and validity. However, since the items were selected from the scales reviewed above, the TEQ also measures not only empathy but also other structures. For instance, four items in the TEQ were created from

empathic concern subscale items of the IRI that are much more closely aligned with sympathy than empathy.

2.4. Measurement of teacher empathy

The previously described empathy scales were developed in the general population. As mentioned earlier, empathy is highly context dependent, and teachers' empathy for their pupils in educational contexts may differ from that for random others. As a result, these scales may lack explanatory and predictive value for assessing teachers' empathy in relation to their pupils.

To date, only one study has developed an empathy scale specifically for teachers and tied it to the educational situation: the Teacher Empathy Scale (TES, Bouton, 2014). The Bouton (2014) follows the three-dimensional theoretical framework of empathy, including cognitive, emotional and behavioural components. Like the IRI, the TES adopts a broad definition of empathy. Cognitive empathy was defined as "the ability to understand the perspective of another person"; emotional empathy was defined as "the ability to experience the feelings of another person"; and behavioural empathy was defined as "the ability to both verbally, nonverbally, and physically communicate empathy to another person". The items of the TES were written based on considerations of the empathy dimension and other valid and reliable socioemotional scales. Certain items were designed to assess teachers' empathy for random others, and other items were intended to assess teachers' empathy for their pupils. Although the reliability and validity of the TES was proven, after carefully reviewing the items, we suspect that the TES may not purely measure empathy. For example, the item "If non-English speaking students are placed in my classroom I get frustrated because my current curriculum will have to be adapted" (emotional empathy), assess one's own emotion rather than one's experience of another's feelings, which clearly does not fit the definition of empathy. Similarly, the item "I have volunteered to assist others who needed help in some way" reflects individuals' prosocial behavioural tendencies rather than empathy expression.

3. The present study

Today's education environment requires teachers to develop high empathic skills in their professional work. However, instruments for measuring such empathy skills are lacking. Existing measurement scales are often criticized for their use of purely affective or cognitive conceptualizations and for measuring constructs other than empathy. Moreover, these scales were developed in the general population and are not tied to the educational situation. Therefore, it is urgent to develop a psychometrically sound instrument to measure teachers' empathy in the educational context. This instrument developed in this study is denoted as the EST. The EST attempts to address the aforementioned limitations of existing scales from three aspects: (1) balancing the emphasis on cognitive empathy (i.e., the ability of teachers to understand their pupils' emotional state) versus affective empathy (i.e., teachers' ability to share and experience their pupils' emotional state); (2) distinguishing empathy from related concepts (i.e., perspective taking, theory of mind and sympathy); and (3) most importantly, tying the scale to the specific educational situation of the teacher-student interaction.

To meet these goals, we first conducted an open-ended survey to identify the typical empathic behaviours and empathic situations of teachers in educational contexts and developed the preliminary items of the scale. Then, we conducted exploratory factor analysis (EFA) to identify the factor structure of the newly developed EST and confirmatory factor analysis (CFA) to examine the stability of the exploratory structure. We also established convergent validity by assessing the relationships between the EST and perspective taking, empathic concern, prosocial behaviour and teacher-student relationships and calculated Cronbach's alpha to determine the reliability of the scales.

4. Method

4.1. Participants and procedure

Three groups participated in this study: 92 teachers in Group 1, 382 teachers in Group 2, and 504 teachers in Group 3. Group 1 was used for an open-ended survey; Group 2 was used for EFA; and Group 3 was used for CFA, validity analysis, reliability analysis. Table 1 provides detailed demographic information on the three groups of participants.

All participants were recruited through an online survey site. The participants were asked to report demographic information prior to completing the questionnaire, including sex, age, years teaching in the classroom, whether they were head teachers (i.e., in charge of a class), grade taught, subject taught, school district and school type. The participants were informed that the data would only be used for scientific research and that the confidentiality and anonymity of personal data were guaranteed. Each participant received RMB ¥5–10 as compensation for participating.

4.2. Item development

Items were developed based on three considerations. First, we selected as the theoretical framework the two-dimensional model of empathy, which holds that empathy includes cognitive and affective components. Cognitive empathy is the ability to understand pupils' feelings, while affective empathy is defined as vicariously experiencing the feelings of pupils. Second, to capture the essence of teacher empathy in the field of education, we conducted an open-ended survey of teachers. The survey consisted of two open-ended questions soliciting a

Table 1
Overview of participants' demographic variables.

Demographic variables		Group1 (n = 92)	Group2 (n = 382)	Group3 (n = 504)
Sex	Female	94 %	75 %	65 %
	Male	6 %	25 %	35 %
Age (years)	Range	21–59	21–59	21–58
		years	years	years
	21–30	75 %	49 %	40 %
	31–40	13 %	25 %	27 %
	41–50	8 %	15 %	26 %
Years teaching in classroom	51–60	4 %	11 %	8 %
	Range	1–39	1–40	1–40
		years	years	years
	<1	4 %	3 %	3 %
	1–5	50 %	46 %	36 %
	6–10	23 %	16 %	12 %
	11–15	6 %	9 %	8 %
	16–20	6 %	9 %	14 %
	21–25	5 %	6 %	11 %
	26–30	3 %	5 %	9 %
Head teacher	>30	3 %	6 %	7 %
	Yes	50 %	36 %	48 %
Grades taught	No	50 %	64 %	52 %
	Grades1–6 (primary school)	32 %	47 %	38 %
	Grades 7–9 (junior high school)	47 %	30 %	38 %
	Grades 10–12 (high school)	13 %	20 %	24 %
Subjects taught	Multiple grades	8 %	3 %	0 %
	Chinese	24 %	22 %	29 %
	Math	24 %	19 %	23 %
	English	16 %	16 %	13 %
	Other	36 %	43 %	32 %
	Multiple subjects	0 %	0 %	2 %
School district	City or urban	50 %	55 %	38 %
	Rural	50 %	45 %	62 %
School type	Public school	89 %	88 %	94 %
	Private school	11 %	12 %	6 %

description of empathic performance (Q1: *What does a highly empathic teacher look like in teacher-student interaction?*) and empathic situations (Q2: *In which situation does a teacher show empathy in teacher-student interaction?*) in the teaching profession. Third, we examined other valid and reliable empathy scales, primarily examining terminology to accurately reflect the concept of empathy.

The items were written in three steps. First, based on the open-ended survey data, we summarized teachers' typical empathic performance and empathic situations (with the criterion that they were mentioned by over 40 % of the participants; Fig. 1) and initially generated 58 items. Second, two authors of this paper rated each item as either measuring cognitive or affective empathy or neither according to their accepted definitions. If both raters agreed the item measured cognitive or affective empathy, the item was included. By this process, 19 items were identified as measuring cognitive empathy, and 13 items were identified as measuring affective empathy. Third, to further establish the level of content validity, two scholars with expertise in the field of empathy were recruited to review the 32 items and indicate their suitability for assessing teacher empathy. This step resulted in 1 item being removed. Additionally, 6 in-service teachers (2 primary school teachers, 2 middle school teachers, and 2 high school teachers) were invited to revise the items to eliminate unclear wording. A total of 31 items were retained. The items were evaluated on a 4-point Likert scale (1: *strongly disagree*, 2: *slightly disagree*, 3: *slightly agree*, 4: *strongly agree*). The 4-point Likert scale forced participants to make a choice, as the option of *neither agree nor disagree* was not available. Fig. 1 shows the theoretical framework and item sources of the initial version of the EST.

4.3. Measures

4.3.1. Empathy scale for teachers

All of the participants completed the EST, which was evaluated on a 4-point Likert scale.

4.3.2. Perspective taking

The perspective-taking subscale of the Chinese version of the IRI (Siu & Shek, 2005) was administered. This subscale assesses the ability to place oneself in another person's position, which is regarded as a way of achieving empathy (Cuff et al., 2014). The perspective-taking subscale consists of seven items, and responses are provided according to a 5-point Likert scale ranging from 1 (*Does not describe me well*) to 5 (*Does describe me well*). The Cronbach's alpha for this subscale was 0.72 in the current sample.

4.3.3. Empathic concern

The empathic concern subscale of the Chinese version of the IRI (Siu & Shek, 2005) was administered. This subscale measures concern and sorrow over others' misfortune or pain, which is considered to result from empathy (Eisenberg & Fabes, 1990). The empathic concern subscale consists of seven items, and responses are provided according to a 5-point Likert scale ranging from 1 (*Does not describe me well*) to 5 (*Does describe me well*). The Cronbach's alpha for this subscale was 0.75 in the current sample.

4.3.4. Prosocial behaviour tendencies

The emotional prosocial tendencies subscale of the Chinese version of the Prosocial Tendencies Measure (PTM, Kou, Hong, Tan, & Li, 2007) was used. This subscale measures the tendency of individuals to engage in prosocial behaviour in situations in which their emotions are aroused. This subscale consists of 5 items and is scored on a 5-point scale ranging from 1 (*Very unlike me*) to 5 (*Very like me*). The Cronbach's alpha for this subscale was 0.87 in the current sample.

4.3.5. Student-teacher relationship

The closeness subscale of the Student-Teacher Relationship Scale (STRS, Wang, Wang, & Zhang, 2001) was used to measure teachers'

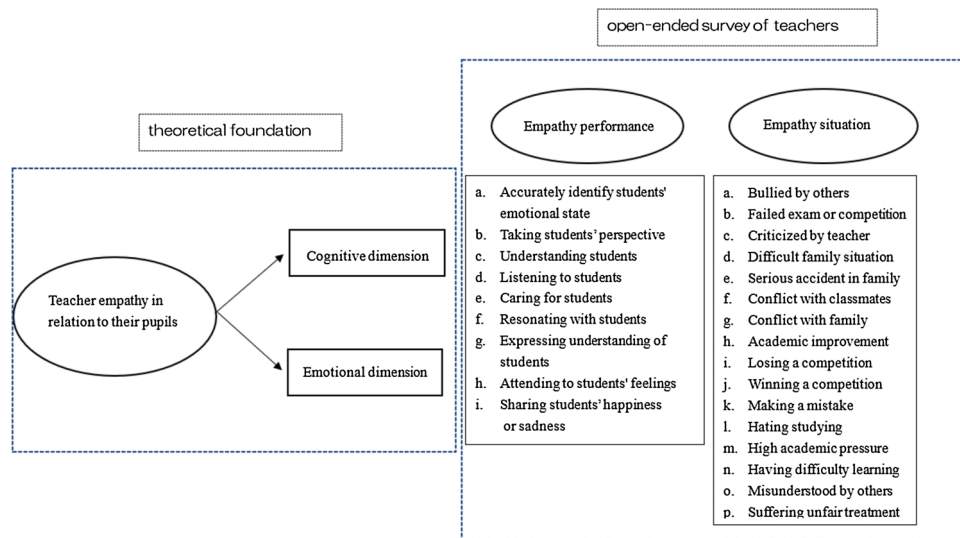


Fig. 1. Theoretical framework and item sources of the initial version of the EST.

perceptions of intimacy with their young pupils. This subscale consists of 5 statements rated using a 5-point Likert scale ranging from 1 (*Totally not true*) to 5 (*Totally true*). The Cronbach's alpha for this subscale was 0.87 in the current sample.

4.4. Analysis and results

4.4.1. EFA

EFA was performed to explore the factor structure of the scale using SPSS 20.0.

The Kaiser-Meyer-Olkin (KMO) test (0.86) and Bartlett's sphericity test ($p < .001$) supported the suitability of the data for factor analysis. The initial 31 items yielded five factors with eigenvalues greater than one (Kaiser, 1960). However, the screen test (Cattell, 1966) and parallel analysis (Horn, 1965) yielded a three-factor solution. Since parallel analysis is considered the most accurate procedure for factor extraction (Henson & Roberts, 2006), EFA was conducted with only three factors extracted. Twelve items were deleted due to low loadings (≤ 0.4) and cross-loadings ($\geq .25$).

A second exploratory analysis calling for three factors to be extracted was conducted on the remaining 19 items. The results showed that 9 items with factor loadings ranging from .51 to .76 loaded on factor 1 (F1), five items with factor loadings ranging from .65 to .80 loaded on factor 2 (F2), and five items with factor loadings ranging from .68 to .80 loaded on factor 3 (F3). The three factors accounted for 52.08 % of the variance. The item factor loadings are summarized in Table 2.

Factor 1 involves recognizing, inferring and understanding pupils' emotions and is therefore labelled *cognitive empathy*. Factor 2 encompasses sharing and experiencing pupils' negative emotions and is therefore labelled *negative affective empathy*. Factor 3 is similar to factor 2, but it involves positive emotion and is therefore labelled *positive affective empathy*.

4.4.2. CFA

CFA was conducted to confirm the three-factor model of the scale using Amos 23.0.

A maximum likelihood estimation was performed to evaluate model fit. Multiple fit indices were employed: (1) the chi-square to degree-of-freedom ratio (χ^2/df); (2) the comparative fit index (CFI); (3) the Tucker-Lewis Index (TLI); (4) the root mean square error of approximation (RMSEA); and (5) the standardized root mean square residual (SRMR). χ^2/df values less than 3.0 (or 5.0), CFI and TLI values greater than .90, and RMSEA and SRMR values less than .08 were considered

Table 2

Exploratory factor analysis of the EST (Group 2, n = 382).

Items	Factor		
	1	2	3
I can quickly tell whether my pupils are happy or not.	.51		
When pupils make a mistake, I usually try to imagine myself in their shoes for a while.	.62		
Before criticizing pupils, I try to imagine how I would feel if I were in their place.	.62		
I can tell when a pupil is nervous, even if he or she tries to hide it.	.63		
I usually pay close attention to the emotional states of pupils in class.	.63		
Pupils always say I am good at understanding their feelings.	.66		
I can infer my pupils' emotional states from their language.	.69		
I usually understand my pupils' feelings when they are in low spirits.	.69		
I can know how my pupils feel by paying attention to their facial expressions or body language.	.76		
Pupils' bad moods affect me a lot.		.65	
I sometimes get caught in the negative emotions of my pupils.		.72	
I feel sad when something bad happens to my pupils.		.74	
When the pupils are sad due to failing an exam, I am also very depressed.		.79	
I am inclined to feel anxious when my pupils feel anxious.		.80	
I'm also very excited when I see pupils receive prizes on the podium.			-.68
Seeing the pupils happy makes me very happy.			-.70
When a pupil is happy for being praised, I can experience his or her inner joy.			-.76
When the pupils smile, I am happy too.			-.78
I experience the excitement and pride of pupils when they get good grades.			-.80

Note: All of the items were written and administered in Chinese. An expert was responsible for translating the items into English for publication purposes.

indicators of acceptable fit (Hu & Bentler, 1999; Schermelleh-Engel, Moosbrugger, & Müller, 2003).

The CFA results revealed that the three-factor model represented a poor fit for the data ($\chi^2/df = 3.38$, CFI = .88, TLI = .87, RMSEA = .07, 90 % confidence interval for RMSEA between .06 and .08, SRMR = .06). The fit index of the model according to CFI and TLI was not acceptable. The report of the modification index indicated that a better fit would be obtained if the residuals between item 8 (e7) and item 9 (e8) were correlated (the modification index was 149.4). Items 8 and 9 both measure aspects regarding understanding pupils' feelings by adopting

their perspective and could be strongly related. The modified three-factor model represented a good fit for the data ($\chi^2/df = 2.26$, CFI = .94, TLI = .90, RMSEA = .05, confidence interval for RMSEA between .04 and .06, SRMR = .05).

Scores on the subscales of the EST were calculated by totalling the corresponding item scores. The sum of the three subscales provided the cumulative total empathy score. The total empathy score was positively correlated with all of the subscales ($.57 \leq r \leq .82$, $ps < .001$). Positive affective empathy was positively correlated with negative affective empathy ($r = .12$, $p < .01$) and cognitive empathy ($r = .54$, $p < .001$). There was no correlation between cognitive empathy and negative affective empathy.

4.4.3. Internal consistency and convergent validity

We calculated Cronbach's alpha to test the reliability of the EST and its three dimensions. To test convergent validity, we examined the correlation of EST scores with perspective taking, empathic concern, prosocial behaviour and teacher-student relationships. The total empathy score and the subscales of the EST, except negative affective empathy, were positively related to perspective taking and empathic concern, prosocial behaviour tendency, and teacher-student relationships. The Cronbach's alpha and correlation coefficients are shown in Table 3.

5. Discussion

5.1. Reliability and validity of the EST

To test the validity and reliability of the newly developed EST, different approaches, e.g., internal consistency (by using the alpha coefficient), content validity (by using an expert review), structural validity (by using EFA and CFA), and convergent validity (by calculating the correlation with relevant personality and relationship variables), were adopted.

The CFA and EFA both support a three-dimensional structure of EST, including cognitive empathy, negative affective empathy and positive affective empathy. This result is consistent with the current view of empathy that claims empathy is a multidimensional construct and consists of cognitive and affective aspects (Baron-Cohen & Wheelwright, 2004; Cohen & Strayer, 1996; Davis, 1983; Preston & de Waal, 2002). However, unlike any previous measure of empathy, the EST separates positive affective empathy and negative affective empathy. Previous empirical studies on empathy have overwhelmingly focused on empathy regarding the negative emotions of others (for a review, see Fan, Duncan, de Greck, & Northoff, 2011), and most existing empathy scales have been concerned with individuals' emotion-sharing ability in the face of others' pain and distress (Davis, 1983; Reniers et al., 2011). However, recent studies have shown that sharing another person's positive emotions, labelled positive empathy, is a common interpersonal phenomenon that improves interpersonal outcomes and encourages prosocial behaviours (for a review, see Morelli, Lieberman, & Zaki, 2015). More importantly, studies have suggested that feeling others' positive emotions is a capacity distinct from feeling their negative emotions

(Andreychik & Lewis, 2017; Andreychik & Migliaccio, 2015; Lamm, Silani, & Singer, 2015). In daily teacher-student interactions, sharing and experiencing pupils' joy and being happy about their successes is a common phenomenon among teachers. Therefore, we believe that the separation of positive affective empathy and negative affective empathy in the EST is reasonable and necessary.

Notably, however, negative affective empathy was not correlated with cognitive empathy, and although statistically significant, its correlation with positive affective empathy was low. We attempt to explain this seemingly surprising result. Sharing others' negative emotions often involves an emotional cost because others' suffering usually makes us feel bad (Zaki, 2014). Being overly sensitive to other people's suffering could thus be detrimental and have a series of negative consequences, such as compassion fatigue or burnout (Gleichgerrcht & Decety, 2013, 2014; Wróbel, 2013). Research has indicated that people regulate their emotions to cope with this emotional cost. For example, research has shown that physicians (vs. nonphysicians) have lower empathy levels when facing patients' suffering, which was interpreted as physicians proactively downregulating their empathy response to dampen feelings of distress and execute effective treatment (Cheng et al., 2007; Decety, Yang, & Cheng, 2010). We think this phenomenon also occurs in the teaching profession. Frequently sharing pupils' negative emotions could cause emotional exhaustion that would interfere with teachers' work and well-being. To avoid negative consequences, teachers regulate their emotions to reduce negative affective empathy. In this case, even though the teachers could accurately identify and understand pupils' feelings (high cognitive empathy), they might still show low negative affective empathy. Negative affective empathy, therefore, does not increase with the improvement of cognitive empathy. This explanation is supported by the descriptive analysis: the mean score for negative affective empathy was the lowest among the three dimensions ($F(2,1006) = 1108$, $p < 0.001$, $\eta^2 = .69$).

Furthermore, we calculated Cronbach's alpha to test the reliability of the EST. The results revealed that the alpha coefficient of the entire scale and three subscales were high, which demonstrates that the EST is reliable. Additionally, we assessed convergent validity by calculating the correlation of the EST with perspective taking, empathic concern, prosocial behaviour and teacher-student relationships. Although perspective taking and empathetic concern in the IRI have been criticized for failing to adequately assess empathy (Baron-Cohen & Wheelwright, 2004), it is undeniable that they are closely related to empathy (Cuff et al., 2014; Eisenberg & Fabes, 1990). Specifically, perspective taking is considered to be an effective way to achieve empathy (Cuff et al., 2014), and sympathy measured by empathetic concern is also considered to be a consequence of empathy (Eisenberg & Fabes, 1990). In line with this prediction, the EST is positively associated with perspective taking and empathic concern. Concerning the relationship between the EST and prosocial behaviour, the results also confirmed the expected positive relationship. Furthermore, as hypothesized, the EST was positively associated with teacher-student relationships. Overall, the analyses in our study provide evidence for the reliability and validity of the EST.

Table 3
EST convergent validity and internal consistency reliability (Group 3, n = 504).

	α	1	2	3	4	5	6	7	8
1. EST total score	.81	1							
2. Cognitive empathy	.84	.82**	1						
3. Negative affective empathy	.74	.57**	.08	1					
4. Positive affective empathy	.78	.70**	.54**	.12**	1				
5. Perspective taking	.72	.44**	.54**	-.04	.33**	1			
6. Empathic concern	.75	.43**	.45**	.07	.39**	.32**	1		
7. Prosocial behaviour	.87	.47**	.49**	.06	.44**	.45**	.41**	1	
8. Teacher-student relationship	.86	.47**	.55**	.01	.35**	.44**	.46**	.59**	1

Note: ** $p < .01$ * $p < .05$.

5.2. Implications

This study has important implications for researchers and practitioners in the field of teacher empathy because it provides a psychometrically sound, easily administered measurement instrument. Once a valid and reliable measurement tool is available, empirical studies of teacher empathy will proliferate. The EST can be used to detect individual differences and discover developmental patterns of empathy among primary, middle and high school teachers. For instance, using the EST, we can compare the empathy level of teachers in different disciplines or schools, and we can also compare the empathy level of teachers with different numbers of teaching years. The EST can also be used to investigate how teacher empathy is related to and affects other variables. For instance, future studies might concentrate on exploring the relation between teacher empathy and pupils' academic performance and well-being or the relation between teacher empathy and teachers' teaching outcomes and professional development. Examining these relations may result in a better understanding of teacher empathy. Furthermore, as the positive effects of teacher empathy have become increasingly apparent, programmes to improve teachers' empathy skills have been developed. The EST could be employed to evaluate the effectiveness of empathy interventions and training programmes.

5.3. Limitations

While this study offers valuable information, several limitations should be noted. First, the study was web-based, and the participants voluntarily completed the questionnaire online. Such a data collection method might introduce sample bias. Individuals with high levels of empathy and altruism might have been more likely to participate. However, our study compensated participation with money; hence, the participants might also have been motivated by the compensation, which might reduce the bias to a certain extent. Second, the EST is a self-reported instrument, which could lead to certain problems. Specifically, empathy is a highly valued trait in teaching professionals; thus, participants might respond in a socially desirable manner. The anonymity of the online survey could, however, have reduced this response bias. In addition, the EST focuses on teachers' self-perceptions of their empathy, which leaves open the possibility that the results might be subject to human perception errors; e.g., one "thinks" that one understands another person, but the other person does not share this view (Duan, 2000). Therefore, future studies are required that investigate the extent to which the EST corresponds to other measures, such as pupil ratings or behavioural performance during actual teaching. Third, current evidence for the validity of the EST is limited to correlations with perspective taking, empathic concern, prosocial behaviour and teacher-student relationships. An important next step is to demonstrate the validity of the EST against the general empathy scale in teacher-student group empathy measurement. For example, future studies could compare the correlation between the EST and general empathy scales with teachers' empathy performance in actual professional work. Fourth, the samples for these studies were exclusively recruited in China. Thus, it is unclear whether the EST is applicable in educational contexts of other cultures. Therefore, the EST should be further validated in other cultural contexts. Finally, it is important to bear in mind that the EST provides insights into teachers' average feelings of empathy for their pupils and cannot be used to measure empathy for a particular student. Teachers' empathy could differ depending on the student that they are dealing with. They might have higher empathy, for example, for students who are similar to themselves than for students who are different. Future research should specify the particular student and investigate these diversity issues further.

6. Conclusion

This study developed and validated the EST, which is tied to specific

educational situations and aligned with the current theoretical framework and definition of empathy. EFA and CFA results indicate that the EST has satisfactory reliability and validity. The EST could be used to assess the empathy level of primary, middle and high school teachers.

Declaration of Competing Interest

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

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