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The multidimensional teacher well-being: a mixed-methods approach

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ABSTRACT

This paper describes the development and validation of the multidimensional Teacher Well-being Inventory underlined by a rational-empirical approach using teacher samples from China. A 20-item multidimensional instrument on teacher well-being was established with good psychometric characteristics. The results yielded five dimensions, which comprises of physical, emotional/psychological, cognitive, social, and spiritual well-being. This concise measurement targets assessing the most salient well-being scenarios of teachers at work. This validated measurement can serve as a more robust gauge for promoting well-being literacy and functioning of individual teachers, students and schools in response to the OECD 2030 agenda of building the wellness society.

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Teacher well-being; rational-empirical approach; mixed method; instrument validation

Introduction

Teacher well-being is crucial for society and schools (Zhang et al., 2023). The idea of the 'wellness society' is a 'shared destination' which incorporates constant change and unprecedented uncertainties for a better world according to the OECD action on the promotion of Learning Compass 2030 (The Organization for Economic Co-operation and Development, 2019b, p. 1). This Learning Compass blueprint highlights individual and collective well-being so that 'one is able to work with others for the common good' (OECD, 2019b, p. 1). Teachers being one of the key change agents, their well-being is essential not only for themselves and their schools, but also for the future society. Grounded on the cascading effect (Ungar, 2021), it is known that the best way to foster student well-being is to promote teacher well-being. In other words, if teachers keep well, this will have a positive impact on their individual well-being but also on the collective well-being of their surroundings (including student well-being) (Harding et al., 2019; Ling et al., 2022). This will be beneficial for nurturing human capital and one step forward for the 'shared destination' of a wellness society (OECD, 2019b).

When considering the organisational aspect, teacher well-being plays a vital role in flourishing schools, particularly, teaching improvement, student outcomes, and school

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effectiveness (Cheng et al., 2021; Cherkowski & Walker, 2018; Hascher et al., 2021; School Mental Health Group, 2019; Viac & Fraser, 2020). Fullan (2008) proposes the first out of six secrets of successful leadership as loving the employees. He pointed to Shackleton's leadership (Morrell et al., 2001) that always put the well-being of the crew first. In addition to its contribution to future societal and organisational needs, the nature of the teaching job also puts teacher well-being in need (McCallum, 2020). Teaching is generally considered a challenging profession due to professional complexities and challenges including collegial competition, standardised performativity, increasing accountability, and instant appraisal (Capone & Petrillo, 2020). It has long been taken for granted that teachers, as professionals, should be able to look after their own well-being, hence largely leaving teacher well-being neglected both in research and practice (Tarrasch et al., 2020; Viac & Fraser, 2020). With increasing demands for academic accountability and academic emphasis, scholars and stakeholders have been keener to dig into what school teachers should give their priority to, such as improving teaching quality and student outcomes, which is believed to sacrifice teacher well-being (Dreer & Gouasé, 2021; Hascher & Waber, 2021). Recent review studies on teacher well-being revealed that teacher occupational well-being is at risk worldwide due to the high burden of the teaching profession, increasing academic accountability, challenging societal demands on teachers, and complex management mechanisms (Chen & Day, 2014; Cumming, 2017; Hascher & Waber, 2021). Promotion of teacher well-being therefore has become one key solution to the retention of quality education, as well as to the sustainable development of teachers, students, schools and even society through robust means (Chen et al., 2020; OECD, 2019a).

Although understanding and enhancing teacher well-being has been considered to be critical in some ways, the research has largely been neglected worldwide. Particularly, an amorphous use of the instruments to measure teacher well-being is apparent and this phenomenon seems prevalent. The majority of existing studies have simply adopted well-being instruments developed from general populations, which may not best capture the unique nature of teaching and essence of teacher well-being (Hascher & Waber, 2021) as it is claimed that well-being 'is something we all aim for, underpinned by positive notions, yet is unique to each of us' as it varies with 'individual, family and community beliefs, values, experiences, culture, opportunities and contexts across time and change' (McCallum & Price, 2015, p. 17). Stiglitz et al. (2009) claimed that 'what we measure affects what we do; and if our measurements are flawed, decisions may be distorted' (p. 7). Therefore, a robust measurement of teacher well-being that is specially designed for assessing teacher well-being is needed (Hascher & Waber, 2021). To fill this gap, this project aimed at developing and validating a multidimensional Teacher Well-being Inventory (TWI) by adopting a theoretical-empirical approach using sequential empirical studies tested on samples from Chinese school teachers.

Theoretical framework

Conceptualizing well-being and teacher well-being

Well-being is an intriguing but elusive construct about which scholars have not yet reached a consensus regarding its definition although investigations in the

field commenced many years ago. Examining the literature, the definitions of well-being vary across disciplines. For example, well-being refers to the pursuit of bodily pleasure, human appetites, and self-interest (Kahneman et al., 1999). Going beyond the positive state, the The World Health Organization (1946) defined well-being as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity' (p. 2). This definition not only embraces a wider scope of well-being, but also implies a multidimensional view of well-being, which then has been utilised for the mass testing of students and teachers by The Organization for Economic Co-operation and Development (2020). This multidimensional approach promises a more precise assessment of the relationships among well-being and other concepts than the 'affect-only' approach or other single domains for capturing the essence of teacher well-being (OECD, 2020; Zacher & Schmitt, 2016).

Looking at the teacher well-being literature, four major observations are made. First, classifications of teacher well-being are vague. Some studies have investigated teacher well-being through a general perspective (e.g. Culshaw & Kurian, 2021; Fu et al., 2021). Others have focused on a single perspective (e.g. mental well-being by Sun et al., 2021; personal well-being by; Veronese et al., 2018a; subjective well-being by; Soykan et al., 2019). A few scholars have adopted a multidimensional perspective (e.g. physical, psychological, social, organisational dimensions by Costa et al., 2021; physical and mental, cognitive, subjective, and social domains by; Viac & Fraser, 2020). Second, components of teacher well-being are ill-defined. Many studies measured teacher well-being indirectly via other related constructs. For instance, burnout by Camacho et al. (2021); emotional exhaustion by Chan et al. (2021); job satisfaction by Hilger et al. (2021); or stress by Carroll et al. (2021). Third, correlates of teacher well-being are mixed. Some studies may regard the constructs as one of the elements of teacher well-being, whilst others consider they may be influential drivers or consequences of teacher well-being. For example, one study (Cece et al., 2021a) uses burnout to measure teacher well-being and regards work engagement as an outcome construct. The other study considers these two constructs as teacher well-being (Cece et al., 2021b). Furthermore, some studies regard job satisfaction as teacher well-being (Hilger et al., 2021), but other studies separate teacher well-being and job satisfaction (Dreer, 2021; Han, 2022). This vague conceptualisation on teacher well-being leads to a blurred phenomenon in empirical investigations of drivers, correlates and consequences of teacher well-being (to be addressed in detail in the following sections). Fourth, the studies may not accurately represent teacher well-being because the instruments used may not be as suitable as they claim. For example, to derive theoretical claims outlining that teacher well-being is related to the field of psychology's notion of well-being, the questionnaire used was based on an instrument that is typically used in health science (e.g. Kaur & Singh, 2019; Veronese et al., 2018a). To address the above concerns and gaps, this project adopts a multidimension approach to well-being to develop and validate a teacher well-being instrument.

Literature review: occupational well-being of teachers

Drivers and correlates of teacher well-being

Scholars have generally focused on identifying influential individual and organisational drivers and correlates of teacher well-being with preference using quantitative methods (Hascher & Waber, 2021).

The majority of existing literature investigated how individual factors representing personal traits and virtues and sense of self-judgement may relate to teacher well-being. These influential factors consist of personality traits (emotional intelligence by Cece et al., 2021a), optimism (Edara et al., 2021), resilience (Burić et al., 2019), psychological capital (Soykan et al., 2019), self-efficacy (Lee et al., 2022), work motivation (Hobson & Maxwell, 2017), coping strategies (coping strategies by Aulén et al., 2021); emotion regulation (Carroll et al., 2022); emotional labour (Burić et al., 2021), professional competence (Capone & Petrillo, 2020), job satisfaction (Kumar, 2022), and organisational commitment (Shoshani & Eldor, 2016). For example, with a large sample of Croatian teachers, Burić et al. (2021) identified the existence of six emotional labour profiles of teachers that were characterised by different combinations of deep acting, hiding feelings, and faking emotions related to their well-being measured by positive affects and job satisfaction.

Likewise, influential organisational drivers of teacher well-being have also been examined by emphasising social relationships, school climate, and physical working conditions, again with some inconsistent results (e.g. physical working conditions by Chen & Lee, 2022). Firstly, there is a substantial amount of agreement that positive relationships in school with colleagues, principals, and students are crucial (e.g. Veronese et al., 2018b). It seems that the support from these three main social groups is consistently confirmed to be influential. Principals can provide supportive leadership and a positive working atmosphere (Langford & Crawford, 2022); teachers can support each other, work together, moderate stress and the demands of professional life, and help with coping strategies (e.g. Camacho et al., 2021); and students can give meaning to the teaching profession and reward teachers' work (e.g. Aldrup et al., 2018). Secondly, the supportive existence of a so-called soft work climate, represented through shared visions and values, consistent policies, school culture, organisational justice, professional autonomy, is of considerable importance (e.g. Tsang et al., 2022). Studies found the impact of a supportive learning or school climate on teacher well-being practically significant (e.g. de Biagi et al., 2017). Thirdly, 'hard' working conditions also proved influential. For example, the role of workload or extra duties requires closer analyses, as one study found that workload is clearly negatively related to subjective well-being (Burns & Machin, 2013), but did not predict teacher well-being in general (Chen & Lee, 2022). Student misbehaviour was also identified as a driver to shape teacher well-being mediated by teacher-student relationships (Nunan & Ntombela, 2022).

Outcomes of teacher well-being

Comparatively, data about the outcomes of teacher well-being are rather scarce as not many investigations considered teacher well-being as an outcome construct. Most investigations of teacher well-being have focused more on the relevance to teachers themselves as an individual teacher, followed by their teaching and students. For example, teacher

well-being was shown to influence meaning of work (Brunzell et al., 2018), social relations (Tang et al., 2018), work contentment (Edara et al., 2021), lifelong learning (Hidayat et al., 2022), burnout (Renshaw et al., 2015), work commitment (Hu et al., 2022), and job performance (Kumar, 2022). Along with this impact of teacher well-being on relevant constructs, the mediated influence of teacher well-being on other constructs was also observed. Teacher well-being and basic needs were found to mediate between perceived autonomy support and job satisfaction (Collie et al., 2016). Likewise, the mediating role of teacher well-being between stress caused by students (as well as by colleagues and parents) and depression was confirmed (Hung et al., 2016). In addition to the impact on teachers themselves and teaching, a few studies have investigated how teacher well-being affect students. For example, teacher well-being is proven to predict how students perceive interpersonal teacher behaviour, which in turn predicts student well-being (Van Petegem et al., 2007). To sum up, the literature evidence above has served as evidence to develop the teacher well-being instrument in this project.

Measurements of teacher well-being

Examining the teacher well-being literature, the majority of current research adopted an instrument developed from and for the general population (e.g. Ballantyne & Retell, 2020; Ergün & Dewaele, 2021). Only seven instruments of teacher well-being have been developed from and for teachers in particular.

Of these, three instruments were developed to measure one or two domains of teacher well-being. The first one is *the Teacher Well-being Scale* developed by Rebolo and Constantino (2020) in Brazil based on their previous team work (Rebolo & Bueno, 2014). The instrument measures the extent and level of teacher satisfaction pertaining to the objective dimensions of the four labour items, specifically, infrastructural labour, labour activity, relationship, and socioeconomic. The second one is *the Teacher Subjective Wellbeing Questionnaire* (TSWQ) that was originally developed by Renshaw and colleagues (Renshaw et al., 2015) in the US, designed to capture positive dimensions of the psychological functioning of teachers at the workplace. The TSWQ is an eight-item self-report behaviour rating scale for measuring two aspects of teacher well-being consisting of school connectedness and teaching efficacy. The third one is *the Teacher Well-being Single Item Measures* developed by von der Embse and Mankin (2021), also in the US derived from a review of the literature to identify indicators of salient domains intended to capture a comprehensive depiction of teacher wellness by measuring both the positive and negative dimensions of the construct from a dual-factor model of mental health (Greenspoon & Saklofske, 2001). Single item scales are representative of teaching efficacy, school connectedness, and teacher stress, respectively. Most recently, Viac and Fraser (2020) developed the *Teachers' Occupational Well-being Scale* as a by-product of a comprehensive conceptual framework to analyse indicators and consequences of teacher well-being together with other instruments in the OECD context (2020). The fundamental concept of the framework specifies teacher well-being as encompassing four domains: physical and mental, cognitive, social, and subjective well-being.

The rest three instruments developed for groups of teachers or subjects. The fifth one is *the pan-Canadian Teacher Induction Survey* (Kutsyuruba & Walker, 2017), which examined Canadian early-career teachers' perceptions of induction and mentorship

programmes ranging from kindergarten to Grade 12. Kutsyuruba et al. (2019) pulled 14 well-being items from the survey to determine the concept of general well-being of early-career teachers. It contains three factors, external well-being, school structure, and internal well-being. The sixth one is *the Subjective Well-being of Kindergarten Teachers* developed by Wei (2013) among Taiwanese kindergarten teachers based on previous studies (Dulewicz & Higgs, 1999). This instrument evaluates teachers' subjective well-being by identifying four dimensions of well-being, namely, autonomy and purpose in life, control of financial and physical conditions, relationships with others, and job satisfaction and personal growth. The seventh one is the *Teacher Well-being Questionnaire* associated with ICT in particular by de Klerk et al. (2013) with 322 Spanish teachers. The instrument consists of 25 items which could be allocated into values/projects, motivation, competences, satisfaction, emotions, and general well-being.

To sum up, the majority of these instruments have measured teacher well-being from a general perspective. These instruments have significantly contributed to measuring teacher well-being. However, some gaps are observed. First, some instruments only cover one or two aspects of teacher well-being. For example, *the Teacher Well-being Scale* (Rebolo & Constantino, 2020) for teacher satisfaction; *Subjective Wellbeing Questionnaire* (Renshaw et al., 2015) for subjective well-being. This would narrow the scope of our understanding of teacher well-being, which may not well represent and capture the essence of teacher well-being (McCallum & Price, 2015). Second, some instruments did not go through a robust validity procedure. For example, *the Teacher Well-being Single Item Measures* (von der Embse & Mankin, 2021) and the *Teachers' Occupational Well-being Scale* (Viac & Fraser, 2020) were based only on the existing literature, not by a targeted sample of teachers from empirical evidence. The lack of a robust validity procedure may lead to inaccurate measurement in future use (Clark & Watson, 2019; Oosterveld et al., 2019). Third, some instruments were especially developed for a particular interest in teacher groups rather than for teachers in general. For example, *the pan-Canadian Teacher Induction Survey* (Kutsyuruba & Walker, 2017) was for examining well-being of Canadian early-career teachers and *the Subjective Well-being of Kindergarten Teachers* (Wei, 2013) was for Kindergarten Teachers only. In essence, none of them was developed from a multidimensional perspective, for teachers in general, and with a robust validity procedure using a theoretical-empirical approach. In response to these concerns, this project aims at developing an instrument that (1) stays current with the teacher well-being literature; (2) is developed from and for school teachers, (3) embeds multidimensions into an integrated well-being model; and (4) uses a theoretical-empirical approach with a robust validity procedure.

Methods

The aim of this study is to develop and validate a psychometrically grounded self-report, namely, the Teacher Well-being Inventory (TWI), which will measure a variety of theoretically and empirically relevant school teachers' salient moments regarding their well-being in relation to their working experiences in school settings in China. Four stages are employed in this paper using existing literature and different independent samples in four sequential empirical studies (e.g. Study 1 for Stage 1, Study 2 & Study 3

for Stage 2, Study 3 (repeatedly used) for Stage 3, and Study 4 for Stage 4) in order to verify content validity, construct validity, criterion validity and cross validity.

Stage 1. Establishing content validity

The aim of Stage I is to establish the content validity of the TWI which typically consists of two steps. In the first step of instrument development, the nature, scope, and items of the measurement were outlined using existing literature and theories. The second step was to create item dimensions and pool those relating to teacher well-being based on relevant literature and one empirical study using a sample of 25 school teachers (Study 1).

The literature review was conducted. The research team firstly defined content domains from existing literature and theories relating to well-being (e.g. Bech, 2004; Richardson et al., 2014) and teacher well-being (e.g. Kutsyuruba & Walker, 2017; OECD, 2020; Renshaw et al., 2015; Viac & Fraser, 2020) and then generated items for each domain. The two principles were especially utilised during the process. One is the multidimensional nature of well-being (OECD, 2020; WHO, 2014). The TWI tended to cover multiple dimensions of well-being that school teachers experience in relation to their work. The other is that we tried to follow the seven conceptual characteristics of well-being identified above. After a comprehensive review, six dimensions of teacher well-being with 23 items, namely, physical (5 items), emotional (3 items), psychological (3 items), cognitive (4 items), social (4 items), and spiritual well-being (4 items), were identified. After the review, Study 1 was conducted.

Study 1 then turned to generating new domains and new items for each domain by interviewing 25 teachers from four primary schools in one district in China obtained through professional connections.

Sample and procedure

The sample consisted of 18 females and 7 males with an average of 9 years work experience. Their ages ranged from 30 to 49 years with an average age of 36. An individual semi-structured interview was conducted with the 25 participants. They were asked to (1) share their views of the nature and categories of teacher well-being; (2) share two scenarios in which they experienced the most salient teacher well-being relating to their work (e.g. students, colleagues, and other professionals).

Results

The participants described a range of teacher well-being experienced from the aforementioned six dimensions. In general, the results from interviews were consistent with those in the literature. Teachers reported a total of 21 well-being items in six dimensions, for instance, physical (3 items), emotional (4 items), psychological (3 items), cognitive (4 items), social (4 items), and spiritual well-being (3 items) in addition to the items from the literature. As a result, a TWI with 44 items was generated to enable evaluation of each content domain relating to teacher well-being. The TWI comprised six domains of well-being with physical (8 items), emotional (7 items), psychological (6 items), cognitive (8 items), social (8 items), and spiritual well-being (7 items).

Stage 2. Establishing construct validity

Phase 2 tested the construct validity of the TWI using two samples of teachers in two sequential empirical studies (Study 2 and Study 3).

Study 2 aimed to demonstrate preliminary evidence on the factor structure, reduce the items which did not fit well, and unveil the latent dimensions of the TWI.

Sample and procedure

A sample of 340 primary teachers in a district in China was obtained through professional connections using an on-line survey. Among these participants, 255 (75%) were females and 85 (25%) males with an average age of 40 years old and 18 years of work experience. More than a third of these teachers ($n = 111$) had less than ten years of work experience of being a teacher, nearly half of the teachers (47.5%, $n = 151$) had ten to thirty years, and 17.6% ($n = 56$) had greater than thirty years. The study employed a symmetric agreement Likert scale with 6 points without a neutral point. Exploratory factor analysis (EFA) was employed to generate the model.

Results

During this process, 12 items were dropped and a 32-item TWI with the same six factors remained, namely, physical (5 items), emotional (5 items), psychological (5 items), cognitive (6 items), social (6 items), and spiritual well-being (5 items).

Study 3 aimed to confirm the latent structure and test the psychometric features of the TWI with a different sample of respondents.

Sample and procedure

A different sample of 537 primary teachers from schools in the same district in China responded to our call. Among these participants, 131 (24.4%) were male and 406 (75.6%) females with an average age of 40 years and 17 years of work experience. 37% ($n = 183$) of these teachers had less than ten years of work experience, nearly half (47.5%, $n = 235$) of them had ten to thirty years, and 15.5% ($n = 77$) had greater than thirty years. The exploratory model identified in Study 3 was then evaluated by confirmative factor analysis (CFA). A multi-criteria approach for acceptable model fit was adapted (Marsh et al., 2004).

Results

This section reports the CFA model, reliability, and internal construct validity. First, three trimmed models, namely, Model 1 with one dimension, Model 2 with six dimensions, and Model 3 with five dimensions, were identified and compared (Table 1). The 20-item model with five dimensions was given the same analysis and demonstrated a better model

Table 1. Model fit comparison.

	Chi-square (df)	CFI	TLI	Gamma hat	RMSEA	90% C.I.	SRMR
Model 1	1729.90(170)	.699	.664		.130	.125~.136	.100
Model 2	1120.25(237)	.871	.850		.083	.078~.088	.062
Model 3	583.51(160)	.918	.903		.070	.064~.076	.060

Note. Model 1= the model with one factor; Model 2= the model with six factors; Model 3= the model with five factors; $N = 537$.

Table 2. Teacher well-being Inventory (TWI) factors, items, and factor loadings.

Factors and Items	*Factor Loading*
F1. Physical Well-being	
1. I feel exhausted at the end of working day.	.74
2. I suffer from work-related illness.	.62
3. I have trouble in sleeping.	.66
4. I feel physical tension or discomfort at work.	.80
F2. Emotional & Psychological Well-being	
5. I am passionate about being a teacher.	.77
6. I look forward to going to work every day.	.84
7. My work life has been filled with things that interest me.	.62
8. I feel like a winner when my students make progress.	.45
F3. Cognitive Well-being	
9. I can deal with multiple work-related tasks at the same time.	.54
10. I can engage in high-ordering thinking activities at work.	.78
11. I can foresee the professional problems.	.65
12. I can craft the teaching job to be manageable.	.88
F4. Social Well-being	
13. I get along well with my colleagues and students.	.72
14. I feel supported by my colleagues and students.	.72
15. I have a good professional network.	.77
16. I enjoy being in new working situations that require me to coordinate with new partners.	.76
F5. Spiritual Well-being	
17. I have a purposeful and meaningful professional life.	.92
18. My sense of ethics grounds me to deal with conflicting issues at work.	.47
19. My sense of mission guides my professional directions.	.87
20. I integrate my 'inner' self with my professional life.	.50

Table 3. TWI descriptive statistics, Cronbach α, and factor inter-correlations.

			Factor Inter-Correlations (*r*)				
Resilience Scale	*M*[†] *(SD)*	Cronbach (α)	F1	F2	F3	F4	F5
F1. Physical	2.86 (1.15)	.79	—	.22**	.17**	.18**	.20**
F2. Emo & Psycho	4.88 (.90)	.75		—	.50**	.69**	.61**
F3. Cognitive	4.68 (.80)	.78			—	.60**	.71**
F4. Social	5.08 (.75)	.83				—	.68**
F5. Spiritual	4.91 (.75)	.77					—

Note. **Correlation is significant at the 0.01 level (2-tailed).

fit by combining emotional and psychological domains. Neither the original 6-dimension model nor the one factor model was ideal in terms of model fit. As a result, five dimensions namely physical, emotional/psychological, cognitive, social and spiritual were kept for further analysis (Table 2). Second, internal reliability of each scale in the TWI was tested. The conducted internal consistency analysis identified the values of Cronbach's alphas which had a range from .75 to .83 with an average value of .84, indicating that each scale was sufficiently reliable such that the model could be meaningfully used in further analysis (Table 3). Descriptive statistics also showed that the mean score of social well-being ($M = 5.08$ out of 6) was the highest, followed by spiritual ($M = 4.91$; $SD = .77$), emotional and psychological ($M = 4.88$; $SD = .90$), cognitive ($M = 4.68$; $SD = .80$), and physical ($M = 2.86$; $SD = .79$). Third, internal construct validity was also examined using correlation coefficient. Table 3 demonstrated that the inter-correlations between the five factors ranged from .17 to .71 with an average value of .46. Latent inter-correlations between five dimensions also yielded the trend that physical well-being is weakly associated with other dimensions whilst the other four dimensions associated strongly with each other.

Table 4. Correlations of the teacher well-being Inventory scales to the flourishing and emotional exhaustion.

Teacher Well-being Inventory	Flourishing	Emotional Exhaustion
F1. Physical Well-being	.24**	−.73**
F2. Emo & Psycho Well-being	.73**	−.27**
F3. Cognitive Wellbeing	.64**	−.12**
F4. Social Well-being	.79**	−.21**
F5. Spiritual Well-being	.72**	−.21**

Note. N = 537; **$p < .001$.

Stage 3. Establishing criterion validity

This phase tested the criterion validity (e.g. convergent validity) between TWI dimensions and the other two measures (the Flourishing scale and the Emotional Exhaustion Scale) using the sample of Study 3.

Procedure

The Flourishing Scale consists of four items adopted from the scale developed by Diener et al. (2010). This scale explains crucial facets of human functioning which range from having and maintaining positive relationships, to having competent feelings, to having meaning, and a purpose in one's life. Moreover, the 4-item Maslach Burnout Inventory (MBI on emotional exhaustion by Enzmann & Kleiber, 1989) was used. All items are phrased in a positive direction by using a 6-point agreement Likert scale.

Results

It is expected that all dimensions from the TWI are positively related to the Flourishing scale (r ranged from |.24| to |.79|) and negatively associated with the Emotional Exhaustion scale (r ranged from |.12| to |.73|) (Table 4). Hence, there are significant and meaningful relationships between espoused teacher well-being, and flourishing, and emotional exhaustion. These associations explain at best a moderate amount of variance at the levels of endorsement of their flourishing and a low amount of variance with emotional exhaustion.

Stage 4. Establishing cross validity

Stage 4 aimed at establishing the cross-validity of the TWI in Study 4. It is expected the generalisability of the TWI will be confirmed by fitting on two cross-validation samples.

Study 4 aimed at establishing the cross validity of TWI using two independent samples from two different educational sectors, primary and secondary schools.

Sample and procedure

It needs to be noted that the primary sample ($n = 537$) in Study 3 was used. The secondary sample was a separate sample ($n = 545$) collected from the same district situated in China. 336 (61.7%) of the participants were females and 209 of them (38.3%) were males. Their average age was 41 years old ($SD = 9.5$), and they had 18 years teaching experience ($SD = 10.5$) as a teacher. 27.7% ($n = 138$) of these participating teachers had under 10 years of relevant teaching work practice. This

Table 5. Fit statistics and invariance results for two models.

Model	Chi-square	CFI	TLI	Grammar hat	RMSEA	SRMR	ΔCFI
Primary (537)	χ2 = 583.51 df = 160 p<.001	.918	.903		.070	.060	-
Secondary (545)	χ2 = 562.26 df = 159 p<.001	.919	.903		.068	.053	-
Configural	χ2 = 1169.78 df = 320 p<.001	.916	.901		.070	.057	-
Metric	χ2 = 1211.03 df = 335 p<.001	.914	.902		.070	.064	.002
Scalar	χ2 = 1237.86 df = 350 p<.001	.913	.905		.068	.066	.001

procedure involves inspecting (1) a configural invariance model which assumes that the same item is associated with the same factor in each group, (2) a metric invariance model that additionally assumes equivalence of item factor loadings, and (3) a scalar invariance model that additionally assumes equality of item intercepts (Cheung & Rensvold, 2002; van de Schoot et al., 2012). Hence, the nested models (i.e. configural, metric, and scalar) with increasingly constrained parameters were tested for model equivalency across teacher samples from two different educational levels. It is recommended that ΔCFI ≤ .01 be used as the preferred cut-off criterion for accepting measurement invariance between nested models since they are independent of both sample size and model complexity. ΔCFI is lower than .01, indicating the compared models are invariant. Otherwise, the compared models are equivalent.

Results

The two models (as shown in Table 5) showed there was a good fit. Overall, the configural invariance models had an acceptable fit and the changes of CFI (ΔCFI) were greater than .01 for equivalent regression weights, factor invariance, and metric invariance, indicating that models can be assumed to be equivalent across the two educational sectors. As such, it can be concluded that the TWI with two samples from both primary and secondary schools measures an equivalent set of latent variables. Hence, the TWI can be used across primary and secondary educational sectors in the China context and other educational sectors through the adoption procedure.

Discussion

This section outlines the major findings of the Teacher Well-being Inventory and validity procedures. The major results on the development and validation of the instrument are discussed by intertwining with existing literature in this section.

The teacher well-being inventory

The TWI embodies a general picture of salient well-being experience at work as a teacher from a multidimensional perspective, namely physical, emotional/psychological, cognitive, social and spiritual well-being. This instrument entails an extended view of teacher well-being which encompasses not only individual well-being literacy and sense-making of the teacher role, but also the broader context of school, culture, and education (Carroll et al., 2022; Hascher & Waber, 2021; Hascher et al., 2021). In other words, these salient five domains of well-being not only demonstrate the well-being experience of teachers at work but also support the multidimensional views of teacher well-being (Viac & Fraser, 2020). This five-domain constitution of teacher well-being serves as a theory- and conception-driven taxonomy to categorise teacher well-being and to map dimension boundaries. The final TWI captures the most salient well-being experience of school teachers namely physical, emotional/psychological, cognitive, social and spiritual resilience. Note that emotional and psychological dimensions were expected to be separate but the teachers in this project selected to combine them after comparing three models consisting of the one-factor solution and six-factor solution. It is possible that the items in the emotional and psychological dimensions share similarities based on the content meaning and inter-correlations. The final five dimensions are associated with job nature, well-being literacy, students, colleagues, school and a wider context.

These teachers gave the highest ranking to social well-being, followed by spiritual, emotional/psychological, cognitive, and physical well-being. It is interesting that although these participants ranked their physical well-being as the lowest, they endorsed a higher level of well-being to other dimensions of well-being. This aligns with the results from international literature on physical conditions of teachers (Carroll et al., 2022; Chen et al., 2020; Kotowskia et al., 2022). When looking at the inter-relationships between physical well-being and other dimensions, physical well-being is weakly associated with other dimensions whilst the other four dimensions associate strongly with each other. Although physical dimension stands along, but the evidence still supports the arguments on the nature of teacher well-being as being multidimensional (OECD, 2020; Viac & Fraser, 2020).

The validation of the teacher well-being inventory

The TWI has gone through a robust validation procedure under the guidelines of the theoretical-empirical approach of test construction (Clark & Watson, 2019; Oosterveld et al., 2019). The TWI demonstrated strong psychometric properties with reliability, content validity, construct validity, criterion, and cross validity with different sets of principal samples. First, the TWI in this project confirmed a good content validity procedure. Six domains with concise items on principal well-being were identified and validated using the existing literature and responses of targeted groups, authentically covering relevant items and content domains in the TWI. This approach guarantees a greater content validity than those solely generated from existing literature or target respondents (Ruscio, 2015). Second, the TWI also verified a good construct validity mechanism. All item loadings in the TWI were greater than .45 and all factor reliabilities were acceptable to excellent ranging from

.75 to .83. The CFA and multiple group analysis procedures also revealed more detailed information on the construct validity of the different models of the TWI. Specifically, we tested various models and three models including one-factor solution, five-factor solution, and six-factor solution were constructed. Through CFA analysis, the five-factor solution with five separate latent variables were proven to be valid and sound based on the statistics and the current theories of teacher well-being. This trimmed model demonstrated a better sense in terms of the model fit and theoretical framework. As such, the TWI is clearly suitable for assessing five dimensions as distinct constructs of teacher well-being but from a multidimensional perspective. Third, the criterion validation provided evidence that the TWI shows a good external validity with two related constructs, namely, flourishing (positive) and emotional exhaustion (negative), by using convergent validity. As expected, all five dimensions of teacher well-being may be positively associated with the flourishing, whilst negatively related to emotional exhaustion. In addition, weak correlations of the physical domain with the other four domains but strong correlations between the rest of the four dimensions of teacher well-being warrant a clear conceptual separation of these five types of well-being as experienced by school teachers in this project. Fourth, cross validity was tested using a different sample of secondary school teachers. Through invariance analysis, the model with two samples (e.g. primary vs secondary) demonstrated a good fit with equivalent regression weights, factor invariance, and metric invariance (Clark & Watson, 2019; Oosterveld et al., 2019). As such, it can be concluded that the TWI with two samples from primary and secondary schools measures an equivalent set of latent variables. Hence, the TWI can be used across primary and secondary educational sectors in the China context and in other relevant contexts through a robust adoption procedure as well.

Overall, the TWI unveils that teachers experience a sense of well-being at work derived from the values of purpose, passion, interaction, connection, self-growth and accomplishment, which are salient for these participants as school teachers (Chen, 2017). Their sense of well-being seems strongly related to the notion of balance between work and life, intrapersonal and interpersonal, individual and context, which helps them address potential stress and ill-being (Camacho et al., 2021; Langford & Crawford, 2022). These closely align with the well-being experience of teachers in other contexts (Edara et al., 2021 from the Philippines; Kotowskia et al., 2022 from the US; Worth & Faulkner-Ellis, 2021 from the UK). Particularly, teachers demonstrated beliefs that the quality of schools, in terms of individual and organisational development and success, closely attaches to their well-being (Chen & Cowie, 2016; Kumar, 2022). Moreover, the role of a teacher was also reinforced, as these participants mentioned, by the meaning of the work (Brunzell et al., 2018). The TWI also posed related drivers including individual factors such as personal traits, coping, motivation, commitment, organisational factors such as social relationships, school climate, and physical working conditions. These partially align with their counterparts from other contexts (Chan et al., 2021 from the United States; Langford & Crawford, 2022 from England; Sokal et al., 2020 from Canada). These findings may indicate that a strengths-based, positive approach to teaching professionals offers an alternative perspective for supporting and encouraging teacher well-being at work (Chen & Cheng, 2022; McCallum, 2021).

Implications

This project will make theoretical, methodological, and practical contributions. First, the project will contribute to the advancement of knowledge production of teacher well-being. It seems that teacher well-being literature has increased in recent decades and blossomed after the outbreak of the COVID-19 pandemic (Hascher & Waber, 2021; Worth & Faulkner-Ellis, 2021). Based on the literature review on teacher well-being aforementioned, the ill-defined conceptualisation of teacher well-being has led to a messy picture of knowledge construction of teacher well-being and inaccurate representation of teacher well-being. The birth of this multidimensional TWI outlines clear components of a teacher well-being construct, which will promote greater scientific efforts on teacher well-being, which will largely advance the maturity of knowledge production in the field (Edmondson & McManus, 2007) in a robust manner.

Second, the TWI has established salient dimensions of teacher well-being at work, which can fill in the gaps revealed in the previous literature review. Particularly, the majority of existing quantitative investigations on teacher well-being have adopted instruments designed for general populations rather than for teachers. Under the guidelines of the rational-empirical approach (Ruscio, 2015), the TWI is embedded in a continuum of drivers, nature, and consequences of teacher well-being. The TWI will provide a concise multidimensional instrument developed from and for school teacher for future research through a robust validation procedure. For example, the research aims at discovering the nature of teacher well-being as an independent construct and its relationships with other related constructs (e.g. performance of teachers, achievement of students and their well-being, and school climate). Moreover, the TWI could be used to establish test—retest reliability in future studies to examine responsiveness to change over time or with different targeted participants. Hence, the emergence of the TWI will encourage more authentic investigations of teacher well-being for future directions.

Thirdly, this project is critical and timely so that the path for achieving quality education will not be at the expense of teacher well-being. This will be especially true in the post-pandemic period. This project will be informative for teacher preparation and development at the initial teacher education stage and the in-service stage. Teacher preparation programmes and courses in universities and continuous training programmes might consider including the element of teacher well-being extracted from empirical evidences in the proposed project. Particularly, professional development programmes can be developed to promote well-being literacy especially awareness and coping strategies of prospective and in-service teachers. The incorporation of well-being literacy should be regarded as an ongoing component of teacher professional development and teacher selection. Moreover, it is expected that this project will make policy-makers, researchers, school principals and teachers be aware of the importance of teacher well-being literacy in the evaluation. The standards for school teachers might include a teacher well-being component as one of the professional capitals for developing teacher capacity and an evaluation mechanism as a key change agent (Hascher & Waber, 2021; McCallum, 2021).

Limitations

Despite its significance, two major limitations of this project are outlined. First, the four samples of participating principals were convenience samples obtained through professional networks from one district in China. This non-random approach may cause some sampling bias (Gravetter & Forzano, 2011). Consequently, the results may not be generalisable to other samples of principals. To lessen these potential sampling bias, future studies should test and re-test the TWI using random and weighted sampling techniques involving more diverse teacher samples (Renshaw et al., 2015) in other regions and different school levels. Second, it is acknowledged that the measure used was the subjective experiences of teacher well-being, although self-report is a widely accepted standard of measurement (Thomas et al., 2019). Such retrospective judgements may not reflect the 'true scores' of well-being experiences of teachers, but be influenced by their personal beliefs about their experience in various work situations. Future studies may consider involving more diverse methods to access teacher well-being such as observation or shadow interview to boost the authenticity of the construct of teacher well-being.

To sum up, rather than covering discrete constructs, the current project developed and validated a multidimensional instrument. Rather than creating an exhaustive measure which aims to evaluate all possible occupational well-being of school teachers, the TWI is claimed as a concise and parsimonious instrument aiming at assessing most salient domains of teacher well-being at work. Within this scope, we produced a theoretically and empirically validated measure that can serve as a more robust means for gauging comprehensive understanding of teacher well-being. Therefore, we hope that future research will pick up where this project leaves off, further validating and adopting the TWI as both a basic research instrument and means of promoting well-being literacy and functioning of an individual teacher, students, schools, and ultimately a wellness society. All in all, we will be on the way to not sacrificing teacher well-being for quality education.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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