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Development and Validation of Physical Education Teacher Workload Scale

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ABSTRACT

Teacher workload is a major contributor to teacher well-being, engagement in work, and instruction effectiveness, especially in schools in the public sector and with limited resources. Physical Education teachers are uniquely burdened by their workload responsibilities as a result of their instructional, administrative, extracurricular and physically demanding work, yet very few and context specific measurement is available in Pakistan. This study was aimed at development and validation of Physical education teacher workload scale (PETWS) in government secondary schools of Punjab, Pakistan. Following scale development procedures that have been established, items were created based on literature review and practitioner input and content validity was established using expert evaluation. After item refinement, the final scale was made up of 18 items. Exploratory Factor Analysis made on a sample of about 250 Physical Education teachers produced a clear four factor structure which was corroborated by an acceptable Kaiser-Meyer-Olkin value

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(KMO = 0.774) and a significant Bartlett's Test of Sphericity (kh2 = 715.12, p < .001). Confirmative Factor Analysis of an independent sample of teachers who were not part of the study (around 200) indicated a good fit of the model (extra statistics down below) such as stats of fit as kh2/df = 2.36, CFI = .928, TLI = .919, RMSEA = .058, SRMR = .049. Convergent validity was evident with Average Variance Extracted values ranging from .53 to .57 and discriminant validity evident using the Fornell-Larcker criterion and HTMT ratios below .85. The scale showed acceptable internal consistency with an overall Cronbach's alpha of .809 ranging from .78 to .83 on the subscales. These results suggest that PETWS is a valid and reliable tool for measuring workload-related organizational support in Physical Education teachers and can be used successfully in research efforts and policy development to enhance the working conditions and functional functioning of teachers.

Keywords: Physical Education teachers, teacher workload, scale development, validity and reliability, organizational support

Introduction

Teacher workload has become a key topic in the educational research literature because of its implications for teachers' well-being, job performance and instructional effectiveness. Workload generally is the quantity and intensity of work that teachers must do, such as instructional responsibilities, clerical responsibilities, and other school-related duties. Empirical evidence has suggested that excessive workload has been linked to stress, burnout, low motivation, and low teaching effectiveness (Aslam et al., 2022). In terms of developing educational systems like Pakistan where schools may be subject to a lack of resources and staffing, the workload of teachers can become rather demanding.

Teachers of Physical Education (PE) have a unique range of experience regarding workload when compared to teachers of other subjects. In addition to classroom delivery, PE teachers are often tasked with leading school teams, holding sports events, maintaining equipment, keeping students safe and doing physically challenging tasks throughout the normal school day. These role-specific demands are part of a multidimensional workload composed of instructional, administrative,

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extracurricular and physical/time-pressure components of work. However, a lot of research on teacher workload currently is based on generic measures which may not capture the unique nature of the professional responsibilities of PE teachers.

The literature has further shown that workload does not operate separately but has an interaction with organizational and psychological factors. The Job Demands-Resources (JD-R) model is a model which argues that high demands at work, such as workload, can create strain, whereas job resources, such as organizational support, can lead to motivation and engagement (Bakker & Demerouti, 2017). Work engagement, which is defined as vigor, dedication, and absorption, has been shown to play an important role in the linkage of working conditions and performance outcomes among teachers (Yu, 2024). Similarly, perceived organizational support has been found to be a protective factor that can buffer the negative effects of heavy workload and improve the engagement and effectiveness of teachers.

Despite the theoretical significance of workload in understanding professional functioning of the teachers, there is an apparent deficit of validated context specific instruments aimed at assessing professional functioning in terms of workload of teachers especially Physical Education teachers in Pakistan. Scale development literature emphasizes that the initial steps of valid measurement are the entail and clearly defining the construct and having assurance of content validity by systematically evaluating the content by experts (DeVellis, 2017). Content validity is usually determined with the help of quantitative tools such as Content Validity Index (CVI) and Lawshe's Content Validity Ratio (CVR), which determine the relevance and necessity of items based on the judgment of experts (Lawshe, 1975; Zamanzadeh et al., 2015).

To overcome this gap, in the present study an attempt is made to develop and validate the Physical Education Teacher Workload Scale (PETWS) in the context of Pakistan. By having a psychometrically sound and contextually related instrument at hand, the present study aims to contribute to research on the issue of teacher workload and aid their evidence-based endeavors to enhance working conditions, work engagement, and teaching effectiveness amongst Physical

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Education teachers.

Methodology

Research Design

The present study adopted a methodological research design, intended for developing and validating a measurement instrument. A cross-sectional survey approach was used in data collection aimed at investigating the factor structure, reliability and validity of the Physical Education Teacher Workload Scale (PETWS). This is a common design to recommend for scale development and psychometric validation in educational research (DeVellis, 2017).

Participants and Sampling

The purpose of the study was to survey teachers of Physical Education (PET) at the secondary level, both male and female teachers, who are teaching in government schools of Punjab, Pakistan. Only teachers who are currently working in a public-sector secondary school were included to maintain homogeneity in terms of context and policy relevance. Participants were asked to have at least a year of experience in teaching at the secondary level.

A multistage sampling technique was applied. In the first stage government secondary schools were selected from different districts of Punjab. In the second stage, the Physical Education teachers at these schools were invited to participate. For factor analytic procedures, the study complied with the widely accepted recommendation of at least 5-10 participants as the criterion for item recruitment, with more than 200 as a general criterion for sample size to allow stable factor solutions (Hair et al., 2019).

Instrument Development Procedure

The development of the Physical Education Teacher Workload Scale (PETWS) occurred in faithful adherence to an established multi-phase procedure for scale development (Boateng et al., 2018; DeVellis, 2017).

Teacher workload was conceptualized as a multidimensional construct comprising of the instructional, administrative, extracurricular or coaching and physical or time pressure demands experienced by the Physical Education teachers working in the government secondary schools of Punjab. This conceptualization

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sought to reflect the notion of the wide, complex notion of professional responsibility specific to the role of the Physical Education teachers in the public sector, school concept.

An initial pool of items was created from a comprehensive review of the literature on teacher workload and the professional responsibilities of Physical Education teachers. This process was complemented by ad-hoc discussions with practicing Physical Education Teachers in government schools (i.e. informal discussions) to ensure that it is practically relevant. The items were framed with reference to the organizational diagram, role expectations and working conditions prevalent in the public sector schools in Punjab.

The tentative list of items was then reviewed with a small group of Physical Education teachers to determine face validity. They reviewed the items for clarity, appropriate use of language and appropriate relevance. Based on their feedback, minor changes were made to increase the clarity and the overall, overall understanding.

Following this review the items were organised into clearly defined subdomains that related to the dimensions of teacher workload identified from the review. Operational definitions for each subdomain were prepared to be used for guiding expert judgement in the content validation process and for consistent interpretation of the items.

Prior to formal content validation, additional revision of item pool was conducted. Redundant, unclear or ambiguous items identified during preliminary reviews were revised or removed so that a more focused and coherent set of items was developed for evaluation.

Content validity of the Physical Education Teacher Workload Scale (PETWS) was determined using a panel of subject matter experts; 10 experts in Physical Education, teacher education, and educational measurement. Each of the experts rated the items on a three-point scale (essential, useful but not essential and not necessary). The Content Validity Ratio (CVR) for each item was used the formula by Lawshe (1975), CVR = (n[?] [?] N/2) / (N/2) where n[?] is the number of experts who rate an item as being essential, and N is the number of

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experts. Following Lawshe's critical values, items whose CVR was equal to or greater than 0.62 and judged by a panel of 10 experts were retained. The Content Validity Index (CVI) was obtained to address the overall content validity of the scale as the mean of CVR values of all retained items. Items that did not pass the developed criteria were revised or deleted to further enhance the content validity of the instrument.

Table 1: ***CVR and CVI***

Subscale	Item Code	CVR
Administrative Support	AS1	0.80
	AS2	0.80
	AS3	1.00
	AS4	0.80
	AS5	0.20
	CVI (Administrative Support)	**0.72**
Resources and Facilities	RF1	0.80
	RF2	1.00
	RF3	1.00
	RF4	0.80
	RF5	0.20
	CVI (Resources and Facilities)	**0.76**
Professional Development	PD1	1.00
	PD2	1.00
	PD3	0.80
	PD4	0.70
	CVI (Professional Development)	**0.85**

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Subscale	Item Code	CVR
Recognition and Encouragement	RE1	1.00
	RE2	0.80
	RE3	1.00
	RE4	0.80
	RE5	1.00
	RE6	0.20
	RE7	0.20
	CVI (Recognition and Encouragement)	**0.71**
Overall OSS-PET	**Overall CVI (S-CVI/Ave)**	**0.75**

Table 2: ***CVR and CVI of OSS-PET (After Item Deletion)***

Subscale	Item Code	CVR
Administrative Support	AS1	0.80
	AS2	0.80
	AS3	1.00
	AS4	0.80
	CVI	**0.85**
Resources and Facilities	RF1	0.80
	RF2	1.00
	RF3	1.00
	RF4	0.80
	CVI	**0.90**

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Subscale	Item Code	CVR
Professional Development	PD1	1.00
	PD2	1.00
	PD3	0.80
	PD4	0.60
	CVI	**0.85**
Recognition and Encouragement	RE1	1.00
	RE2	0.80
	RE3	1.00
	RE4	0.80
	RE5	1.00
	CVI	**0.92**
Overall OSS-PET	**Overall CVI (S-CVI/Ave)**	**0.88**

Before the deletion of items, a number of items had low content validity levels (CVR = 0.20), which led to acceptable subscale CVI scores and a moderate overall scale CVI (S-CVI/Ave = 0.75). After removing weak items, all the items showed adequate to high CVR resulting in clear improvements in subscale CVIs (0.85-0.92) and a strong overall content validity of OSS-PET (S-CVI/Ave = 0.88), point out the success of item refinement.

The refined version of PETWS was tested as a pilot study using representative sample of physical education teachers (20-30) of the government secondary schools in Punjab. The aims of the pilot study were to assess item clarity, variability of item responses, completion time, and ease of administration. Pilot testing during this stage is suggested to uncover any possibility of issues yet to be faced before big data collection (Hertzog 2008). Minor wording modifications were done based on pilot feedback.

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Data Collection Procedure

After securing permission from relevant authorities of the education and school administration, data were collected with the assistance of a self-administered questionnaire. The participation was voluntary and informed consent was received from all participants before data collection. The respondents were assured of anonymity and confidentiality, and no identifiable information was recorded. Questionnaires were administered personally with the Physical Education teachers who are employed in the government secondary schools in Punjab, Pakistan. Supervised administration was employed where necessary to accommodate school schedules and ensure completion of the instrument was to be taken.

Data Analysis Plan

Data analysis followed a detailed and multi-staged process following best practices for developing and validating scales (Hair et al., 2019).

Prior to factor analysis, the data was screened for missingness, univariate and multivariate outliers, normality and multicollinearity and descriptive statistics were examined to confirm the suitability of the dataset for factor analytic techniques. Exploratory factor analysis was then performed on Sample 1 consisting of about 250 Physical Education teachers in order to determine the underlying factor structure of the Physical Education Teacher Workload Scale (PETWS). Principal Axis Factoring using oblique rotation was employed, as theoretical expectation was that the workload dimensions would be correlated and sampling adequacy was assessed with the help of the Kaiser- Meyer - Olkin measure and Bartlett's Test of Sphericity. To ensure the structure of factors derived from EFA, Confirmatory Factor Analysis was conducted on the independent sample of about 200 Physical Education teachers (Sample 2). Model fit was determined using several goodness-of-fit measures including the Comparative Fit Index, Tucker-Lewis Index, Root Mean Square Error of Approximation and Standardized Root Mean Square Residual.

Validity was further tested by CFA results wherein convergent validity was tested by using Average Variance Extracted and discriminant validity was tested by comparing AVE values with correlations between factors following the criteria proposed by Fornell and Larcker (1981).

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Internal consistency reliability was determined with Cronbach's alpha coefficient and also composite reliability coefficient ("Reliability of assessment Scales," 2019) for each subscale and for the overall scale, analyses were performed on combined sample of 335 participants, with reliability coefficients 0.70 or greater being acceptable measures of internal consistency (Hair et al., 2019).

RESULTS

Data Screening

Missing Data Analysis

Table 3: ***Little's MCAR Test***

Variable	N	Mean	Std. Deviation	Missing		No. of Extremes[a]	
				Count	Percent	Low	High
OSS_PET_	145	1.7902	0.36283	5	3.3	0	0

Outlier Detection

Table 4: ***Residuals and Outlier Diagnostics (N = 145)***

Statistic	Min	Max	Mean	SD	Cutoff
Standardized Residual	-1.709	1.760	0.000	0.997	±3
Studentized Residual	-1.714	1.774	0.000	1.003	±3
Studentized Deleted Residual	-1.726	1.787	0.000	1.006	±3
Mahalanobis Distance	0.001	5.119	0.993	1.126	χ^2 (1) = 3.84
Cook's Distance	0.000	0.063	0.007	0.008	< 1.00
Centered Leverage Value	0.000	0.036	0.007	0.008	< 0.026

Assumption Testing

Table 5: ***Tests of Normality***

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Organizational Support Scale for	.064	145	.200*	.987	145	.174

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Statistic	Min	Max	Mean	SD	Cutoff
Physical Education Teachers (OSS-PET)					

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Descriptive statistics

Table 6: ***Mean and Standard Deviation***

Variable	N	Mean	Std. Deviation
Organizational Support Scale for Physical Education Teachers (OSS-PET)	145	1.7902	0.36283

Data screening showed there was relatively little missing data (3.3%) for OSS-PET, which supported the adequacy of the data. Outlier diagnostics revealed that all standardized, studentized and deleted residuals were well within +-3, Mahalanobis distance values fell below the critical kh2 value, and the Cook's distance and leverage values fell below recommended cutoffs, so influential outliers were not present. Normality assumptions were satisfied in this study with non-significant results in both Kolmogorov-Smirnov and Shapiro-Wilk tests. Descriptively, the mean OSS-PET score was low to moderate (M = 1.79, SD = 0.36), which indicates that there is comparatively limited perceived organizational support of physical education teachers.

Exploratory Factor Analysis (EFA)

Table 7: ***Results of KMO and Bartlett's Test***

KMO and Bartlett's Test	Value	Factor Matrix (Pattern Matrix)	Item	Factor Loading
Kaiser–Meyer–Olkin Measure of Sampling Adequacy	0.774	**Factor 4**	School management values my contribution as a physical education teacher.	0.680
Bartlett's Test of	715.122	Factor 4	The administration	0.583

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KMO and Bartlett's Test	Value	Factor Matrix (Pattern Matrix)	Item	Factor Loading
Sphericity – Approx. Chi-Square			listens to my professional concerns.	
Degrees of Freedom (df)	153	Factor 4	I receive fair treatment from school leadership.	0.629
Significance (Sig.)	0.000	Factor 4	School leaders support me in performing my duties.	0.600
Required KMO ≥ 0.70	—	**Factor 1**	Facilities are sufficient for effective physical education classes.	0.779
Computed KMO	0.774	Factor 1	Sports equipment is properly maintained.	0.638
Required Sig. ≤ 0.05	—	Factor 1	Facility availability supports my teaching needs.	0.662
Computed Sig.	0.000	Factor 1	Lack of resources limits my teaching effectiveness.	0.600
Factor Loading ≥ 0.40	—	Factor 1	My school provides adequate sports equipment.	0.459
		Factor 3	School encourages my professional growth.	0.750
		Factor 3	Workshops improve my instructional skills.	0.723
		Factor 3	Training programs are relevant to physical	0.670

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KMO and Bartlett's Test	Value	Factor Matrix (Pattern Matrix)	Item	Factor Loading
			education teaching.	
		Factor 3	I am provided with opportunities for professional training.	0.628
		Factor 2	Good performance is acknowledged by management.	0.749
		Factor 2	Recognition motivates me to perform better.	0.702
		Factor 2	My efforts as a physical education teacher are recognized.	0.598
		Factor 2	I feel appreciated for my work.	0.587
		Factor 2	I receive encouragement to improve my teaching.	0.541

The KMO value (0.774) and significant test of Bartlett (kh2 = 715.12, p < .001) showed that the data fit for exploratory factor analysis. EFA showed very clear four factor structure with all items loading above acceptable threshold ([?] 0.40), representing administrative support, resources and facilities, professional development and recognition and encouragement, hence supporting the construct validity of OSS-PET.

Confirmatory Factor Analysis (CFA)

Table 8: ***Confirmatory Factor Analysis (CFA) – Model Fit Indices (OSS-PET)***

Fit Index	Threshold	Value
χ^2 / df	≤ 3.00	2.36

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Fit Index	Threshold	Value
CFI	≥ .90	.928
TLI	≥ .90	.919
RMSEA	≤ .08	.058
SRMR	≤ .08	.049

The results of the CFA showed that there is a good model fit for OSS-PET as all the measures of fit fell within the recommended values (kh2/df = 2.36, CFI = .928, TLI = .919, RMSEA = .058, SRMR = .049), confirming the fitting adequacy of the four-factor measurement model.

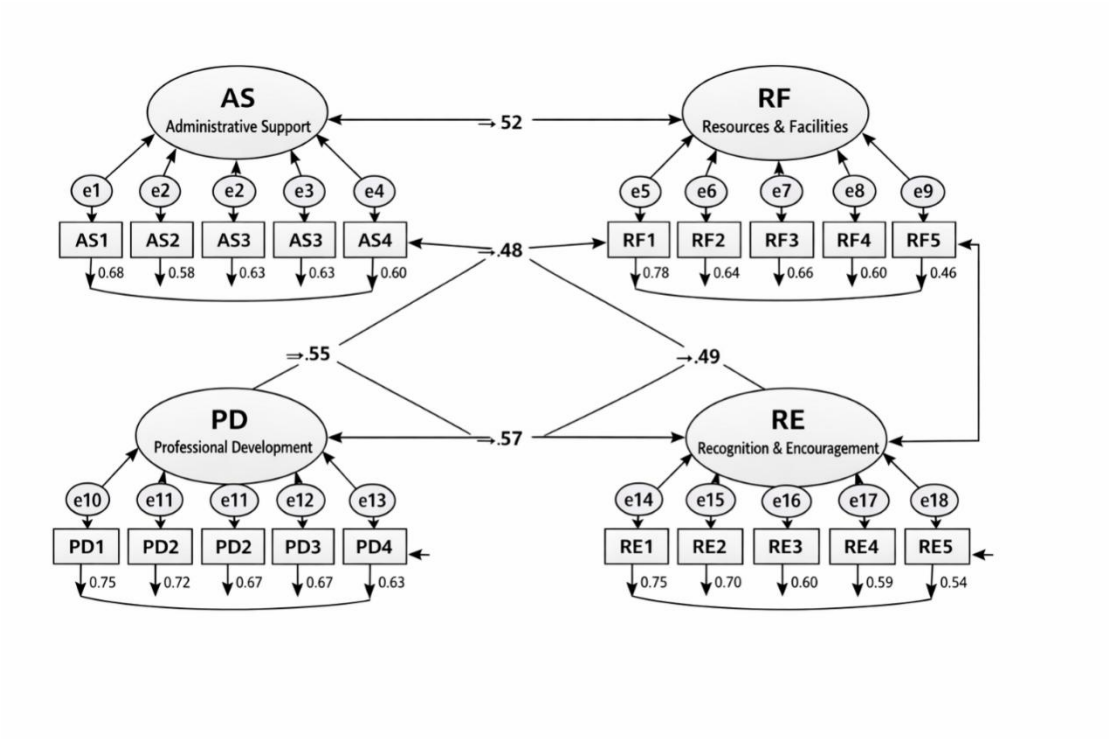


Figure 1: Standardized Solution of CFA for PETWS

The results of the measurement analysis show the standardised factor loadings of all four latent constructs (AS, RF, PD and RE) are acceptable, indicating that items are adequate in relation to what they are supposed to measure. Moderate to strong correlations between the constructs (.48-.57) indicate related but distinct aspects of organizational support in support of the convergent and discriminant validity of the OSS-PET factor structure.

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Convergent and Discriminant Validity

Table 9: ***Convergent Validity***

Construct	Items	AVE
Administrative Support	4	.53
Resources and Facilities	5	.55
Professional Development	4	.57
Recognition and Encouragement	5	.54

Table 10: ***Discriminant Validity – Fornell–Larcker Criterion***

(Diagonal values represent √AVE)

	AS	RF	PD	RE
AS	.73			
RF	.42	.74		
PD	.39	.41	.75	
RE	.36	.38	.40	.73

Table 11: ***Discriminant Validity – HTMT Ratio***

Construct Pair	HTMT
Administrative Support – Resources & Facilities	.61
Administrative Support – Professional Development	.58
Administrative Support – Recognition & Encouragement	.60
Resources & Facilities – Professional Development	.63
Resources & Facilities – Recognition & Encouragement	.59
Professional Development – Recognition & Encouragement	.62

Convergent validity was supported as all constructs showed AVE values that were greater than the recommended value of .50. Discriminant validity was also found, with square roots of AVE greater than inter-construct correlations (Fornell-Larcker criterion) and well below .85 for all HTMT ratios which suggest that four OSS-PET constructs are empirically distinct.

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Reliability Analysis

Reliability Statistics

Measure	Value
Cronbach's Alpha	0.809
Cronbach's Alpha (Standardized Items)	0.810
Number of Items	18

Construct	Short Name	Number of Items	Cronbach's Alpha
Administrative Support	AS	4	0.80
Resources and Facilities	RF	4	0.78
Professional Development	PD	4	0.81
Recognition and Encouragement	RE	5	0.83
Overall	—	18	0.809

Reliability analysis showed satisfactory internal consistency of the scale. The global Cronbach's alpha of the instrument (18 items) was 0.809 (0.810 for standardized items) indicating good reliability. Subscale reliability coefficients were also acceptable with the Cronbach's alpha coefficients of 0.80 for Administrative Support with 4 items, 0.78 for Resources and Facilities with 4 items, 0.81 for Professional Development with 4 items, and 0.83 for Recognition and Encouragement with 5 items.

Discussion

The present study aimed to develop and validate the Physical Education Teacher Workload Scale (PETWS) with the governmental secondary school of India in Punjab of Pakistan. The findings give powerful empirical support of the psychometric soundness of the scale and fill an important gap in the literature related to context specific measurement of Physical Education teacher's workload and related organizational factors.

The results of content validation determined that the initial conceptualization on

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teacher's workload and organizational support was appropriate and relevant for Physical Education teachers. The combined use of expert judgment by CVR and CVI analyses ensured that the items retained were important and representative of the construct. The large increase in both subscale and global CVI values after item deletion speaks to the usefulness of the systematic process of item refinement and aligns with recommended best practices in scale building (DeVellis, 2017; Boateng et al., 2018). These findings suggest that the final version of the PETWS is an adequate measure of the core dimensions of administrative support, resources and facilities, professional development, and recognition and encouragement as experienced by Physical Education teachers.

Exploratory Factor Analysis came up with a clear structure of four factors, which was supported by acceptable KMO values and significant Bartlett's Test of Sphericity. All items showed factor loading greater than the recommended threshold and thus appeared to have made meaningful contributions to factors. The appearance of four very different yet related factors is in line with some of the expectations generated from the Job Demands-Resources view of work demands, which stresses the multidimensional character of the teachers' work environments and support systems (Bakker & Demerouti, 2017). This structure is in line with the distinct professional context of Physical Education teachers, who not only deal with the demands of classroom instruction but also with physical demands, organizational demands and extracurricular demands.

The Confirmatory Factor Analysis provided further support for the four-factor model since all of the fit indices met or surpassed recommended criteria. These results show the model of measurement supposed to represent the implementation of the underlying construction representing an adequate description and is stable over separate samples. The moderate correlations among the latent factors indicate that although the dimensions are related, they are conceptually and empirically distinct supporting the multidimensional conceptualization of organizational support and workload-related experiences among Physical Education teachers.

Convergent validity was established using the AVE values that surpass the .50

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threshold on all the constructs, showing that the measures encompassed enough variance along any construct. Discriminant validity was also established using both Fornell-Larcker criterion and HTMT ratios and showed that each of the constructs was found to be measuring a different aspect of organizational support and workload-related experiences. These findings provide more confidence in the construct validity of the PETWS and indicate that the scale may be useful in looking at differential effects of specific support dimensions on teacher outcomes.

Reliability analyses indicated adequate internal consistency of both the overall scale as well as individual subscales. Cronbach's alpha values were .78 to .83. These coefficients are far more than commonly accepted benchmarks, revealing that the PETWS gives stable and consistent measurements. The robust consistency of the recognition and encouragement and professional development subscales is of special interest given that these dimensions are often cited as key resources which can counteract the negative effects of heavy workload, on the one hand, and promote work engagement, on the other (Yu, 2024).

Descriptive findings showed the relatively low to moderate level of perceived organizational support among Physical Education teachers which is the same shown in previous studies done in Pakistani public schools referring to the scarcity of resources, low levels of recognition and high degree of workload demand (Aslam et al., 2022). This demonstrates the relevance of the PETWS from a practical point of view for identifying areas where institutional support may be lacking and where policy interventions are required.

Overall, the results are inconclusive, but the PETWS is a valid and reliable instrument to measure workload associated with organizational support of Physical Education teachers in Pakistan. By presenting a contextually grounded and psychometrically sound measure, this study adds to the literature on the topic of teacher workload and may offer a powerful tool for use by researchers, school administrators, and policymakers. The scale can be used to support future documentation of the relationships between levels of workload, organizational support, work engagement and teacher well-being, as well as research-based strategies that can help improve working conditions and instructional effectiveness

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in public sector schools.

Conclusion

The present study successfully developed and validated Physical Education Teacher Workload Scale (PETWS) for government secondary schools of Punjab, Pakistan; and Using a systematic and theory-driven approach, the scale showed good evidence of content validity, a well-defined and stable factor structure, adequate convergent and discriminant validity and satisfactory to high levels of internal consistency reliability. The final 18-Item instrument depicts the multidimensional nature of the experiences of Physical Education teachers regarding their workload and organisational support by encompassing four meaningful dimensions - administrative support, resources and facilities, professional development and recognition and encouragement.

The results show that PETWS is a psychometrically valid and contextually relevant tool that can be used to accurately assess workload-related support among Teachers of Physical Education. Given relatively low to moderate levels of perceived support noted in the sample, the scale has practical value in identifying institutional gaps and focusing on specific interventions. PETWS could be successfully deployed by researchers for developing empirical work related to teacher workload and engagement and by educational administrators and policy makers for developing evidence-based strategies aimed at improving working conditions and the well-being of teachers, and ultimately increasing the intensity of the quality of Physical Education in public schools.

Limitations and Future Directions

The study has some limitations that are to be considered. It is in cross-sectional design which limits the causal interpretation, and it only was restricted to the teachers from government secondary schools in the Punjab in the subject area of Physical Education, and thus, might not have broader generality. In addition, there could be response bias in the use of self-reported data.

Future studies should test the PETWS in various regions, types of schools, and educational levels, and investigate the applicability of the PETWS in other cultural contexts. Longitudinal studies are recommended to examine changing

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workload over time and its impact on the outcome for teachers. Further research may also use the scale to assess interventions aimed at improving organisational support and reducing workload among Physical Education teachers

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this study.

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