INTERNATIONAL PREMIER JOURNAL OF LANGUAGES & LITERATURE (IPJLL)
VOLUME 4, ISSUE 1, 2026 **p-ISSN: 3007-2336** **e-ISSN: 3007-2344**

PROFESSIONAL DEVELOPMENT AS A JOB RESOURCE: CAREER STAGE, WORKLOAD, AND TEACHER JOB SATISFACTION IN A MULTILEVEL SCHOOL CONTEXT

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Abstract

Professional development is often treated as a resource that can strengthen teachers' competence, professional agency, and attachment to their work, yet recent research increasingly suggests that participation quantity does not equate to professional development quality, relevance, or fit. This study examined whether count-based exposure to refresher courses was associated with teacher job satisfaction and whether that association varied by career stage or instructional workload. We conducted a cross-sectional multilevel secondary analysis of de-identified survey data from 657 public secondary school teachers nested within 142 schools in Punjab, Pakistan. Overall job satisfaction was assessed with the 60-item Job Satisfaction Scale for Teachers; the primary score showed good internal consistency (Cronbach's alpha = .884). Professional-development exposure was represented by archived refresher-course categories (none, up to four, and more than four). Career stage and weekly teaching-period category were examined as potential moderators. Random-intercept models showed that 24.6% of job-satisfaction variance occurred between schools. In the adjusted main-effects model, neither up to four refresher courses (B = -0.021, 95% CI [-0.088, 0.046], p = .539) nor more than four courses (B = -0.043, 95% CI [-0.126, 0.040], p = .312) was associated with higher job satisfaction relative to no courses. Teachers with 15-30 years (B = 0.099, p = .010) and at least 30 years of experience (B = 0.213, p < .001) reported higher satisfaction than those with less than 15 years, whereas the higher teaching-period category was not associated with lower satisfaction (B = 0.031, p = .366). Professional development did not interact with career stage, likelihood-ratio chi-square (4) = 0.59, p = .964, or workload, likelihood-ratio chi-square (2) = 1.24, p = .537.

Keywords: *Job Demands-Resources Theory, Multilevel Modelling, Professional Development, Teacher Workload.*

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1. Introduction

Teacher job satisfaction is now at the forefront of discussions about the teaching profession's viability and sustainability. The education sector faces staffing and retention challenges, increasingly complex workloads, and expectations to improve teaching quality. In this context, job satisfaction goes beyond overall attitudes toward work. It reflects teachers' self-ratings of their work and workplace and relates to their professional well-being, occupational commitment, and intentions to stay in the profession. Recent international evidence also shows that satisfaction is a consequence of the workforce and that a satisfied teacher does not automatically lead to better measured student outcomes (Jerrim, 2024; OECD, 2025; Wartenberg et al., 2023). Satisfaction is therefore central to the practical significance of workforce stability, professional functioning, and the quality of teachers' occupational experience. The current trend in teacher research is one in which "differences" between demographic groups are shifted to explanations based on working conditions and organizational context. According to international large-scale studies, teachers' job satisfaction is linked to various school-level factors, such as leadership, student behaviour, workload, collaboration, autonomy, and more, with some of the relationships being larger and more positive in some systems than others (Eryilmaz et al., 2025; Lazcano et al., 2025; Xie & Zou, 2025). Recent multilevel and longitudinal studies also show that teacher outcomes are partly school-based, not just based on individual traits (Eryilmaz et al., 2026; Wu & Wu, 2026). This organizational change has methodological implications: teachers in the same school share similar working conditions, routines, leadership, pupils, and constraints, so statistical analyses should account for school-level clustering when possible. Professional development (PD) sits at the nexus of personal development and working conditions. Often seen as a way for teachers to refresh their subject knowledge, to expand their pedagogical repertoire, to gain confidence and engagement, to work with colleagues, and to be flexible on changing curricular and student needs. From a Job Demands-Resources (JD-R) viewpoint, well-designed professional learning can be a job resource that helps teachers meet job demands, achieve job objectives, and maintain motivation to perform (Bakker et al., 2023). Professional development can itself consume time, add to workload, be poorly aligned with teachers' needs, or be experienced as compulsory rather than professionally meaningful. Compagnoni et al. (2024), using experience-sampling data, found that teachers who engaged in more professional-development activity overall reported favorable well-being patterns, but PD activity on particular days could also coincide with greater work-related stress.

Kang and Mavrogordato (2025) found that perceived PD quality was positively associated with job satisfaction, while barriers to participation were negatively related to job satisfaction. Leroy (2025) also showed the relevance of the fit between needs and

supplies: The link between PD and occupational outcomes is contingent on the fit between opportunities and teachers' perceived professional needs. Oduro and Agbale (2026) also find that unmet professional-development needs are negatively associated with job satisfaction for newer TALIS 2024 evidence in South Africa, while collaboration and autonomy are positively correlated. The results call into question a dose-response assumption that the more courses, the more satisfied the teacher is. Career stage may further moderate the effectiveness of PD as a resource. Earlier-level teachers may require induction, pedagogical support, role clarification, mentoring, and a chance to build professional confidence. Advanced, specialized, leadership-oriented or self-directed learning may be sought by more experienced teachers, and they may have a broad wealth of experiential resources. Meanwhile, experience and satisfaction results vary across countries. Using data from 125,764 teachers across 13 countries, Futterer et al. (2023) found that satisfaction with career pathways and preparation was significant, and that professional development did not differ clearly between first- and second-career teachers. Similarly, Admiraal and Kittelsen Roberg (2023) showed that the relationship between job demands, job resources, and satisfaction varies by career stage. Eryilmaz et al. (2025) revealed inconsistent relationships between years of teaching experience and countries. The mixed results suggest that career stage should be included as a moderator in the analysis instead of something that is assumed to have an effect. The second theoretically important boundary condition is workload. Job resources are particularly important when demands are high, as resources can support goal achievement and regulate high demands at work (Bakker et al., 2023).

Teaching workload, however, is multifaceted. It includes instructional hours, lesson preparation, assessment, administrative work, student support, communication with families, emotional labor, and other non-instructional responsibilities. A systematic synthesis by Creagh et al. (2025) describes workload intensification and time poverty as persistent concerns in teachers' work. Recent international evidence also links lower perceived workload to higher job satisfaction (Eryilmaz et al., 2025), while longitudinal JD-R research links demands and resources dynamically to teacher satisfaction and emotional exhaustion (Zhang et al., 2026). Whether professional development offsets a high instructional load, however, is less certain, particularly when PD participation itself requires time and energy.

These questions are particularly relevant to the Pakistani context. Recent studies in Punjab also reflect ongoing interest in teacher job satisfaction and professional development, although much of the local evidence is descriptive, correlational, or limited to between-group comparisons at a single level. Jamil et al. (2024) reported that there was a geographic variation in secondary school teachers' satisfaction, and Latif (2024) revealed that there was a difference in teacher satisfaction in public and private secondary schools

based on gender and other teacher characteristics. Qaisra and Haider (2024) analyzed perceptions of in-service teacher training in Punjab and highlighted the importance of teacher development as an ongoing process. In the present study, Rashid and Maqbool (2025) found a positive correlation between PD participation, teaching effectiveness, and satisfaction among public school teachers in Okara. This type of work is important, but it does not determine whether any lingering relationship remains between a simple archived indicator of refresher-course exposure and satisfaction when teacher characteristics and school clustering are examined together. This study aims to answer this question through a multilevel secondary analysis of public secondary-school teachers in Punjab. It's more focused and specific than a sweeping statement that professional development leads to greater satisfaction. The analysis explores whether refresher-course exposure empirically functions as a job resource. Do the associations differ across career stages? Does higher refresher-course exposure seem to buffer a higher teaching-period category? The study is based on secondary data, which do not measure PD's quality, relevance, length of time, freshness, voluntariness, content, collaboration, or perceived impact, so course participation is not a sign of effective professional learning. Instead, it examines the extreme ends of the observed null or positive correlations to assess the bounds of a widely held policy belief: that more training experiences alone produce a more positive occupational evaluation. A multilevel approach is also employed in the study. If there is significant differences in satisfaction between schools, it is important to take school context into account when analysing teacher-level interventions.

School membership can capture shared but unmeasured conditions such as organizational climate, leadership, resource availability, student behavior, collegial norms, and administrative routines. Recent meta-analytic and multilevel research emphasizes precisely these organizational correlates of teacher attitudes (Hallinger et al., 2025; Lazcano et al., 2025).

2. Literature Review and Theoretical Framework

2.1 Teacher Job Satisfaction and Workforce Sustainability

Job satisfaction is usually understood as an evaluative response to one's work and the conditions under which that work is performed. In teaching, the construct has both profession-oriented and workplace-oriented dimensions. A teacher may value the profession but be dissatisfied with a particular school, or may appreciate a local workplace while questioning the broader attractiveness of teaching. TALIS 2024 retains this distinction by measuring satisfaction with the profession and the current work environment, reflecting the idea that teachers' occupational evaluations are nested in both professional and institutional contexts (OECD, 2025).

More recent studies have shown the significance of job satisfaction and the misleading nature of outcome assumptions. Wartenberg et al. (2023) gathered evidence on

correlates of teacher job satisfaction and showed that it relates to other teacher attributes, work contexts, and teacher outcomes that comprise a larger network. Zhou et al. (2024) placed teacher job satisfaction within a broader network of teacher well-being and occupational functioning in a meta-analysis of 173 studies and 89,876 teachers. Meanwhile, Jerrim (2024) found that the relationship between teacher satisfaction and teachers' own judgements of lesson quality was weaker than the relationship between teachers' judgements of lesson quality and pupils' outcomes, and that the latter was not always evident in the TALIS video-study analysis. International trend research also reveals the importance of school context. The general stability in teacher job satisfaction and the described school climate were identified as important correlates. Satisfaction patterns were related to teacher-student relations, shared decision-making, teacher shortage, and bullying (Eryilmaz et al., 2026).

2.2 Professional Development as a Potential Job Resource

The JD-R framework provides a useful theory for understanding professional development in teachers' work. Job demands are aspects of work that require sustained effort and can have psychological or physiological costs, while job resources can aid in the achievement of goals, lower demand costs, and support learning, motivation, and/or development (Bakker & Demerouti, 2007; Bakker et al., 2023; Demerouti et al., 2001). Professional development is a resource, but not when it's called training. It becomes resource-like when it increases teachers' usable capacity, offers relevant knowledge or support, increases teachers' autonomy or efficacy, strengthens collegial ties, or helps teachers manage the demands of their practical task. Smet's (2022) multilevel analysis of TALIS 2018 data was one of the most direct examinations of the relationship between professional development participation and perceived need. The study found nontrivial interactions between PD need and participation, suggesting that a single attendance count cannot capture professional learning. Using U.S. TALIS 2018 data, Reeves and Hamilton (2022) also concluded that different types of teacher education and professional-learning mechanisms related differently to job satisfaction, teacher self-efficacy, and practices. Such research paves the way for an analytical approach that starts with the question of which forms of PD can be considered meaningful resources, rather than whether they are universally beneficial. The quality aspect is particularly significant. and Mavrogordato (2025) explored several aspects of professional development in the US and found that perceived quality of professional development consistently correlated with job satisfaction, while barriers to participation were negatively correlated. Their findings suggest that the amount of PD is a poor measure of its professional value. Teachers may have several courses available that are not well aligned with classroom needs, are repetitive, are administratively required, or are not linked to collaborative follow-up. On the other hand, fewer opportunities may exist for quality learning to have a professional

impact. Leroy (2025) enhances this argument through a need-supplies fit approach. The study does not assume a linear relationship between the amount of professional development a teacher needs and the benefits opportunities provide; instead, it explores congruence between teachers' professional-development needs and the benefits opportunities provide. For PD to be a valuable resource for job satisfaction and work engagement, it must involve both match and mismatch. Job satisfaction and work engagement rely on combinations of match and mismatch, with fit central to PD's value as a resource. Similarly, Oduro and Agbale (2026) reported a negative relationship between perceived need for professional development and job satisfaction, and a positive relationship between collegial collaboration and teaching autonomy, based on data from South Africa TALIS 2024. Together, these studies suggest that professional learning is a conditional resource its impact is moderated by content, fit, access, autonomy, and social organization. Co-learning, co-development, and co-learning models could be especially relevant considering that they integrate skill development and relational resources. In most systems in the study, Christensen and Jerrim (2025) found a strong positive association between PLCs and job satisfaction, based on data from 127,339 teachers across 40 countries. It was extended by Wu and Wu (2026), who studied collaborative professional learning, teacher efficacy, teacher support for innovation, and satisfaction simultaneously at multiple levels in China. This evidence points to the fact that professional learning that is infused into the context of school experiences and communities could have a different impact than course attendance. Experience sampling evidence also indicates that PD can have resource and demand properties. Compagnoni et al. (2024) tracked 753 teachers for 21 days and found that the more PD an educator participated in, the more satisfied they tended to be with their job and the more they perceived they gained from it, although some PD days may also lead to higher work-related stress. This duality is significant for JD-R interpretation. A professional-learning activity can be developmentally beneficial but also time-consuming, require more coordination, or add to a busy day. Therefore, the value of PD partly depends on how it is organized within workload and school structures.

2.3 Exposure Quantity, Quality, and the Problem of the Dose-Response Assumption

Professional development is frequently documented in policy systems in terms of countable markers such as workshops attended, completed courses, or days spent in training, or achievement of certifications. These are merely administrative tools and fail to be completed theoretically. They believe the units they participate in are similar and that each additional one will lead to more learning or support their profession. Little recent research supports this assumption. The experiences that are created in PD are varied in terms of duration, purpose, pedagogy, coherence, voluntariness, follow-up, collaboration, and connection to the teachers' actual problem with instruction. The difference between exposure and quality is key to understanding the current dataset. The refresher-course

variable, which is archived, categorizes teachers into three groups: none, up to four, or more than four courses. It gives no direct evidence of the substance of those courses, or their perceived usefulness. While a positive coefficient would support a resource interpretation, a null coefficient would not prove that professional development is ineffective. It would reveal only that, as operationalized here, the total exposure to the course is not enough to distinguish overall teacher satisfaction, after controlling for other characteristics.

This distinction is consistent with international evidence. Kang and Mavrogordato (2025) emphasize quality and barriers; Leroy (2025) emphasizes fit; Christensen and Jerrim (2025) emphasize professional learning communities; and Oduro and Agbale (2026) emphasize the relationship among unmet need, collaboration, autonomy, and satisfaction. McJames et al. (2025) found positive effects associated with continuing professional development and induction in a causal-inference machine-learning analysis of English TALIS data, yet their treatment definitions and modelling strategy were considerably richer than a three-category historical count. The implication is not that one study is correct and another is wrong, but that the construct represented by 'professional development' changes with measurement.

A count-based indicator may also conceal selection processes. Teachers who participate frequently may do so because they are highly motivated, because their schools provide more opportunities, because they have greater professional needs, because training is compulsory, or because they occupy roles that require additional courses. Without measures of assignment mechanisms and perceived quality, causal interpretation is inappropriate. The present study therefore treats refresher-course exposure as an observed career-development characteristic and tests whether it displays the pattern expected of a resource, rather than labeling it an intervention effect.

2.4 Career Stage as a Context for Professional Development

Career stage is perhaps theoretically relevant because teachers' developmental needs vary over time, as do their accumulated resources. Earlier career teachers might be building classroom routines, professional identity, curricular content and structures, and networks of support. Mid-career teachers may take on new duties and want to renew or advance their careers. Later-career teachers may have extensive role mastery and organizational knowledge, but may also have fluctuating motivation, health needs, or limited promotion opportunities. Helpful PD at one time can be less helpful at another. Evidence remains mixed. In a study of 13 countries, Futterer et al. (2023) found significant disparities in teachers' satisfaction and the importance of preparation among both first- and second-career teachers, and these differences did not appear consistently across career pathways. This aligns with Admiraal and Kittelsen Roberg (2023), who showed that job demands, resources, and satisfaction also differ by career stage, indicating stage-

conditioning of occupational experience. But Eryilmaz et al. (2025) argued that experience associations were inconsistent across countries, suggesting that years of service is not a universal mechanism. Existing meta-analytical research on teacher wellbeing also suggests that the evidence for experienced teachers on several dimensions of wellbeing is mixed at best (Zhou et al., 2024). Similarly, Toprakci and Karabulut (2025) reported that, overall, the average gender effect on teacher job satisfaction was small, and a similar pattern emerged for the other demographic variables they examined: demographic variables often had small average effects that could mask contextual heterogeneity. Career stage must therefore be analyzed in relation to organizational conditions and not as a determinant. From a resource perspective, two alternative explanations are possible. PD might be more important for teachers with fewer years of teaching experience, as they may have more developmental needs and fewer professional resources. These possibilities can be tested empirically with the present analysis.

2.5 Workload as a Job Demand and a Possible Boundary Condition

One of the most prevalent and talked-about job demands in modern education is teacher workload. Creagh et al. (2025) review and integrate evidence on workload, work intensification, and time poverty, and make clear that the issue extends beyond instructional time. Even if teaching hours seem manageable, administrative compliance, assessment, planning, meetings, communication, student support, and the increased task load can all contribute to this burden. Therefore, a teaching-period count should not be used as a complete measure of workload, but rather as one aspect of workload. At a larger scale, however, substantial evidence shows that workload is generally relevant. Satisfaction with perceived workload was correlated with higher job satisfaction among many of the systems participating in the study by Eryilmaz et al. (2025). OECD (2025) also notes workload and stress as factors that impact teachers' capacity to flourish. In a two-wave longitudinal study of Chinese secondary-school teachers, Zhang et al. (2026) found reciprocal relationships among school-family conflict, emotional exhaustion, leadership support, and job satisfaction, suggesting a dynamic interplay between demands and resources over time. Under conditions of high demand, resources can become particularly important, according to the JD-R framework. For PD, this suggests a buffering hypothesis: professional learning, in the form of increased efficiency, improved classroom management or assessment practices, or increased self-efficacy, might help teachers manage some of the more demanding instructional conditions. However, the opposite may also be true. For teachers with heavier course loads, PD may be added to their existing duties, which can lead to courses being perceived as an additional burden. Compagni et al. (2024) illustrate this trade-off between learning benefits and same-day stress. Theoretically, therefore, the interaction between professional development and workload is informative even if this interaction proves null. The current workload measure must be

used with caution, as the archived categories are defined by the teaching-period category but fail to quantify preparation time, administrative burden, class sizes, emotional workload, or perceived workload. Moderation is therefore tested by the level of instructional exposure, and not by a validated multidimensional workload construct. This restriction is relevant for interpretation and is discussed in detail.

Professional development itself can also be school-organized. Access may depend on leadership priorities, district provision, staffing flexibility, or school culture. Collaborative professional learning depends by definition on organizational arrangements that support shared inquiry. Therefore, a model that treats refresher-course exposure as solely an individual attribute may still need a school-level random component to account for the institutional environment in which participation and satisfaction are located.

2.6 Punjab and the Need for a Context-Sensitive Test

Pakistan's public education system provides an important setting in which to test these relationships because professional development is routinely discussed as a route to teacher improvement, yet the organizational conditions under which it translates into occupational benefit are less well established. Qaisra and Haider (2024) reported that the perceived importance and problems of in-service training in Punjab are evident, and that teachers still need further professional development. Rashid and Maqbool (2025) reported a positive relationship between participation in professional development, teaching effectiveness, and job satisfaction in Okara. While these studies are relevant to local policy, they do not provide evidence on whether cumulative refresher-course exposure is independently related to satisfaction, controlling for career stage, workload, and school clustering. The context matters because recent research on teacher satisfaction in Punjab also indicates the same. In Bahawalpur, Jamil et al. (2024) found that satisfaction and teaching attitudes among public secondary-school teachers also differed across the region and by gender, experience, and sector. Similarly, Latif (2024) reported differences in satisfaction and teaching attitudes among public secondary-school teachers in Bahawalpur based on gender, experience, and sector. This evidence is informative, but recent international methodological developments have produced models that estimate multiple predictors simultaneously and explicitly model school structures hierarchically. The present study contributes to this transition while exercising appropriate prudence given the secondary and cross-sectional nature of the data.

2.7 Research Questions

The following were the research questions of the study:

RQ1. Is refresher-course exposure associated with overall teacher job satisfaction after adjustment for career stage, instructional workload, teacher characteristics, and school context?

RQ2. Does the association between refresher-course exposure and job satisfaction differ across archived career-stage categories?

RQ3. Does the association between refresher-course exposure and job satisfaction differ between the lower and higher weekly teaching-period categories?

RQ4. What proportion of variance in overall job satisfaction is attributable to differences between schools?

3. Method

3.1 Design and Data Source

This study used a cross-sectional multilevel secondary-analysis design. The analytic file contained de-identified survey records for 657 public secondary-school teachers associated with 142 school identifiers in Punjab, Pakistan. The school identifiers represented Lahore, Chakwal, Sargodha, and Gujranwala. All analyses and inferences in this article are restricted to the available 657-teacher/142-school analytic file; no claim is made that the results estimate current province-wide prevalence.

The analytic focus differs from a conventional evaluation of a professional-development program. The dataset does not contain a treatment assignment, pretest-posttest design, course-quality measure, or information on the recency, duration, content, or voluntariness of refresher courses. Accordingly, professional development is operationalized as archived exposure to refresher-course categories, and all reported coefficients are associations rather than causal effects.

3.2 Participants and School Clustering

The sample included 374 male teachers (56.9%) and 283 female teachers (43.1%). Career-stage coding placed 144 teachers (21.9%) in the less-than-15-years category, 423 (64.4%) in the 15-30-years category, and 90 (13.7%) in the highest archived experience category. The archived refresher-course variable classified 178 teachers (27.1%) as reporting no refresher courses, 336 (51.1%) as reporting up to four, and 143 (21.8%) as reporting more than four. The weekly teaching-period variable placed 160 teachers (24.4%) in the lower category and 497 (75.6%) in the higher category.

Teachers were nested within 142 schools. Cluster size ranged from 2 to 10 teachers per school, with a mean of approximately 4.63 and a median of 4. Because several records in a small number of schools disagreed on teacher-reported location or enrollment categories, we used school-level modal values for those variables in mixed models. There were no mode ties. Teacher-strength coding was internally consistent within school identifiers.

3.3 Measures

3.3.1 Overall Teacher Job Satisfaction

Overall job satisfaction was measured using the Job Satisfaction Scale for Teachers (JSST; Mehrotra, 2005), a 60-item Likert-type instrument with five response options. The

archived methodology described six intended content areas: pay, work, promotion, work group/colleagues, working conditions, and supervision. Because the archived file did not include a computed total or preserve an authoritative item-polarity key, we reconstructed the primary scoring procedure transparently from item wording. Nineteen clearly unfavorable statements (items 6, 7, 8, 9, 10, 12, 18, 19, 22, 23, 24, 26, 27, 31, 40, 45, 49, 59, and 60) were reverse-scored so that higher values consistently represented greater satisfaction.

3.3.2 Professional-Development Exposure

The focal predictor was the refresher-course variable with three categories: none, up to four courses, and more than four courses. The variable should be interpreted as count-based exposure rather than a measure of PD quality or impact. It does not capture course duration, subject matter, provider, recency, perceived relevance, voluntary versus compulsory participation, collaborative follow-up, or alignment with individual professional needs.

3.3.3 Career Stage and Instructional Workload

Teaching experience was represented as less than 15 years, 15-30 years, and 30 years and above. The less-than-15 group served as the reference category. Weekly teaching load was represented by the archived lower versus higher teaching-period categories (labelled less than 27 and more than 27 periods per week). Because the original continuous period count was not available, the analysis treats this as a binary instructional-exposure indicator rather than a comprehensive workload measure.

3.3.4 Covariates

Teacher-level covariates were gender, duration in the current school (1-10, 11-20, >20 years), present posting (home station, outstation), other source of income (yes, no), and teaching category (SST Science, SST Arts). School-level covariates were urban/rural location, student enrollment (<1,000, 1,000-2,000, >2,000), and teacher strength (<=25, 26-50, >50 in the analysis). Age was not included in the primary model because of missingness and substantial overlap with teaching experience. Qualification contained nine heterogeneous categories and was omitted from the primary parsimonious specification.

3.4 Statistical Analysis

Analyses proceeded in four stages. First, descriptive statistics were calculated for professional-development exposure, career stage, workload, gender, and school location. Second, an unconditional random-intercept model estimated between-school and within-school variance in job satisfaction and the intraclass correlation coefficient (ICC). Third, a prespecified main-effects model (Model 1) included professional-development exposure, career stage, workload, the teacher-level covariates, the school-level covariates, and a

random intercept for school. We used maximum-likelihood estimation to compare nested models.

Fourth, two interaction models were fitted separately. Model 2 added the Professional Development x Career Stage interaction (four product terms because both variables were categorical). Model 3 added the Professional Development x Workload interaction (two product terms). These models addressed RQ2 and RQ3. Improvement over Model 1 was evaluated using likelihood-ratio tests and Akaike information criterion (AIC). Unstandardized fixed-effect coefficients, standard errors, 95% confidence intervals, and two-sided p-values are reported. Approximate marginal R2 summarizes variance attributable to fixed effects, while conditional R2 summarizes variance attributable to fixed plus school-level random effects.

Two sensitivity strategies were used to test whether the professional-development conclusion depended on a particular specification. First, we re-estimated the main-effects model with ordinary least squares and school-clustered robust standard errors. Second, the three-category refresher-course variable was collapsed to any versus no reported exposure and the main effect and interaction tests were repeated. The sensitivity analyses were not used to select a favorable result; they were used to examine the stability of inference about professional-development exposure.

4. Results

4.1 Descriptive Patterns

Table 1 summarizes the principal study variables. Unadjusted mean job satisfaction was 3.610 among teachers reporting no refresher courses, 3.581 among those reporting up to four, and 3.572 among those reporting more than four. These small mean differences ran opposite to a simple positive dose-response expectation, but they are descriptive and do not account for career composition, school clustering, or other covariates. By contrast, unadjusted job satisfaction increased across career-stage categories, from 3.536 among teachers with less than 15 years of experience to 3.672 in the highest experience category. The higher teaching-period group had a slightly higher unadjusted mean than the lower group (3.599 vs. 3.550).

Table 1. *Descriptive job-satisfaction statistics for focal variables*

Variable	Category	n	Mean	SD
Professional development	None	178	3.610	0.369
	Up to four courses	336	3.581	0.371
	More than four courses	143	3.572	0.402
Career stage	<15 years	144	3.536	0.371
	15-30 years	423	3.586	0.388
	Highest archived category	90	3.672	0.321

Teaching-period category	Lower	160	3.550	0.396
	Higher	497	3.599	0.371
Gender	Male	374	3.524	0.390
	Female	283	3.670	0.343
School location (raw)	Urban	357	3.599	0.378
	Rural	300	3.572	0.377

Professional development exposure was uneven across career stages. Among teachers with no refresher courses, 63 were in the <15-year group, 91 in the 15-30-year group, and 24 in the highest experience group.

4.2 Between-School Variation

The unconditional random-intercept model estimated a between-school variance of 0.035 and a within-school residual variance of 0.107. The resulting ICC was .246, indicating that approximately 24.6% of the observed variance is between schools that shows satisfaction is partly structured by school membership rather than being solely an individual teacher attribute.

4.3 Main-Effects Model: Does Refresher-Course Exposure Predict Satisfaction?

Model 1 significantly improved fit relative to the unconditional model, likelihood-ratio chi-square (16) = 36.11, p = .003, and reduced AIC from 532.98 to 528.87. Approximate marginal R2 was .074 and conditional R2 was .271. Thus, measured fixed effects explained about 7.4% of total variance, whereas the combination of fixed effects and school-level random differences accounted for about 27.1%.

The professional-development coefficients did not support a positive dose-response relationship. Relative to teachers reporting no refresher courses, those reporting up to four had an adjusted coefficient of B = -0.021 (SE = 0.034, 95% CI [-0.088, 0.046], p = .539). Teachers reporting more than four had B = -0.043 (SE = 0.042, 95% CI [-0.126, 0.040], p = .312). Accordingly, RQ1 is answered in the negative for this operationalization: greater count-based refresher-course exposure was not associated with higher overall job satisfaction after adjustment.

Career stage is linked with satisfaction. Compared with teachers with less than 15 years of experience, the 15-30-year group had B = 0.099 (95% CI [0.023, 0.175], p = .010), while the highest experience group had B = 0.213 (95% CI [0.105, 0.322], p < .001). The higher teaching-period category was not associated with lower satisfaction (B = 0.031, p = .366). Female teachers reported higher adjusted satisfaction than male teachers (B = 0.164, p < .001). The remaining measured covariates did not produce statistically reliable main effects at the .05 level, although the SST Arts coefficient was close to conventional significance (B = -0.054, p = .082).

Table 2. Adjusted random-intercept main-effects model predicting overall teacher job satisfaction

Predictor	B	SE	95% CI	p
Intercept	3.480	0.069	[3.344, 3.616]	<.001
PD: up to four vs. none	-0.021	0.034	[-0.088, 0.046]	.539
PD: >4 vs. none	-0.043	0.042	[-0.126, 0.040]	.312
Experience 15-30 vs. <15	0.099	0.039	[0.023, 0.175]	.010
Experience highest vs. <15	0.213	0.055	[0.105, 0.322]	<.001
Higher vs. lower period category	0.031	0.034	[-0.036, 0.098]	.366
Female vs. male	0.164	0.041	[0.083, 0.245]	<.001
11-20 years in school vs. 1-10	-0.014	0.032	[-0.076, 0.049]	.666
>20 years in school vs. 1-10	-0.011	0.050	[-0.109, 0.088]	.833
Out-station vs. home posting	0.008	0.035	[-0.061, 0.078]	.819
No other income vs. yes	-0.042	0.036	[-0.113, 0.029]	.243
SST Arts vs. SST Science	-0.054	0.031	[-0.115, 0.007]	.082
Rural vs. urban	0.002	0.043	[-0.082, 0.086]	.968
Enrollment 1,000-2,000 vs. <1,000	0.077	0.064	[-0.048, 0.201]	.228
Enrollment >2,000 vs. <1,000	-0.020	0.101	[-0.217, 0.177]	.846
Teacher strength 26-50 vs. <=25	0.010	0.057	[-0.101, 0.121]	.863
Teacher strength >50 vs. <=25	-0.041	0.083	[-0.204, 0.122]	.623

Note. N = 657 teachers nested within 142 schools. Professional-development reference group = none. Random-intercept variance = 0.028; residual variance = 0.104. Coefficients are unstandardized.

4.4 Does the Professional-Development Association Differ by Career Stage?

Adding the Professional Development x Career Stage interaction did not improve model fit, likelihood-ratio chi-square(4) = 0.59, p = .964. AIC increased from 528.87 to 536.28, indicating that the additional interaction parameters were not supported by the data. None of the four product terms approached statistical significance: up-to-four x 15-30 years B = 0.001 (p = .992); >4 x 15-30 years B = 0.035 (p = .757); up-to-four x highest experience category B = 0.063 (p = .566); and >4 x highest experience category B = 0.048 (p = .741). Thus, RQ2 was not supported: the relationship between refresher-course exposure and job satisfaction did not differ detectably across the archived career-stage groups.

4.5 Does Professional Development Buffer the Higher Teaching-Period Category?

Adding the Professional Development × Workload interaction also failed to improve fit, likelihood-ratio chi-square (2) = 1.24, p = .537. AIC was 531.63. The up-to-four x higher-load term was B = -0.019 (SE = 0.075, 95% CI [-0.165, 0.127], p = .801), and the >4 x higher-load term was B = -0.093 (SE = 0.087, 95% CI [-0.264, 0.078], p = .287). The interaction estimates did not show the positive pattern expected if greater

refresher-course exposure buffered the higher instructional-load category. RQ3 was therefore not supported.

Table 3. Model-comparison statistics for the primary multilevel analyses.

Model	Log likelihood	AIC	Comparison	LR chi-square (df)	p
Null model	-263.491	532.98	--	--	--
Model 1: main effects	-245.437	528.87	vs. null	36.11 (16)	.003
Model 2: PD x career stage	-245.142	536.28	vs. Model 1	0.59 (4)	.964
Model 3: PD x workload	-244.815	531.63	vs. Model 1	1.24 (2)	.537

4.7 Sensitivity Analyses

In a main-effects ordinary least-squares model with school-clustered robust standard errors, the up-to-four coefficient was B = -0.029 (SE = 0.038, p = .442), and the >4 coefficient was B = -0.043 (SE = 0.049, p = .373). The binary PD x Career Stage interaction did not improve fit, likelihood-ratio chi-square(2) = 0.26, p = .879, and the binary PD x Workload interaction was also nonsignificant, likelihood-ratio chi-square(1) = 0.36, p = .548. This sensitivity is useful because it reduces sparse cells created by crossing the three-category PD measure with career stage.

5. Discussion

The overall conclusion, which is also theoretically informative, is that refresher-course exposure was not related to overall job satisfaction after controlling for career stage, instructional workload, teacher characteristics, school-level covariates, and school clustering. There were no significant differences between the up to 4 and more than 4 categories, and no positive dose-response gradient in the adjusted marginal means for either course or for teachers reporting none. The final results did not change when a robust OLS was used with school-clustered effects and when the exposure to PD was limited in the analysis to any versus none. The outcome doesn't mean that professional development isn't important. It instead marks a measure and boundary of a policy. This variable does not indicate whether teachers have taken any refresher courses, whether those courses were relevant, good, group-based, continuous, self-chosen, timely, or related to their real needs. Recent studies have found that these qualitative attributes are important. Kang and Mavrogordato (2025) found that PD quality and barriers were more consistently associated with satisfaction than participation alone. Leroy (2025) demonstrated that the concept of ‘needs-supplies fit’ plays an important role in job satisfaction and work engagement. In contrast, Christensen and Jerrim (2025) identified positive cross-national relationships between collaboration (as a form of learning) and PLSs. Oduro and Agbale (2026) also highlight collaboration and autonomy, as well as unmet needs. In this context, the null finding is not unusual. It can be adapted to a modern context, where PD is viewed as a work tool that is meaningful to teachers when it provides something they can work with.

A 'workshop' that places a time constraint on a problem, although the problem is not part of the event, may be of little resource value. On the other hand, a well-designed collaborative learning cycle can enhance competence, efficacy, collegial support, and autonomy, even if it counts as only one in the participation tally for administrators. The present data cannot differentiate these experiences, so a simple cumulative-count assumption should be avoided. This result also complements the study reporting a positive PD-satisfaction relationship. Continuing professional development and induction were identified as possible favourable interventions by McJames et al. (2025), who applied causal-inference machine learning to TALIS data. In U.S. TALIS data, Reeves and Hamilton (2022) identified teacher-education mechanisms that were associated with benefits. In the literature, Smet (2022) showed an interaction between PD need and participation in multilevel models. The stronger, or more differentiated, findings do not weaken the present null finding; rather, they suggest that operationalization and context may shape what 'professional development' looks like empirically. The second major finding was that there was no sign of the predicted moderation by career stage. All four interaction terms were small and imprecise, and the interaction model did not significantly affect model fit. This indicates that refresher-course exposure showed no evidence of being more beneficial for early- or experienced-career teachers, or of being differently related to teacher satisfaction among the three archived career groups. Again, it's relative to measurement. Career-stage theories suggest that teachers at different career stages have different learning needs, but course counts do not indicate whether course content was appropriate to the career stage. Early-career teachers may attend early-career generic sessions unrelated to induction, while later-career teachers may attend generic sessions unrelated to advanced professional goals, and both groups might report little connection between participation and satisfaction. Moderator fit may matter more than volume. The outcome also aligns with Futterer et al. (2023), who found no simple difference in the importance of professional development by career pathway, but important differences in both satisfaction and preparation. While the demands-and-resources configuration is influenced by career stage, as shown by Admiraal and Kittelsen Roberg (2023), this does not mean all resources have a stage-specific association. The current results thus validate a more limited claim: Career stage is related to satisfaction, but does not seem to modify the relationship between course-count exposure and satisfaction. The experience gradient is substantively significant and positive. Adjusted satisfaction ratings were higher for teachers with 15-30 years of experience or five or more years of experience than for those with fewer than 15 years. Several possible noncausal explanations include role mastery, institutional routine adaptation, occupational security, more favorable assignments, and survivor selection. Decades-long teachers may differ systematically from those who leave the profession. These mechanisms cannot be differentiated cross-sectionally and therefore

should not be interpreted as meaning that years of service are a root cause of satisfaction, as they are used to guide future longitudinal research. The third focal result was the PD x Workload interaction, which was not significant. There was no significant difference between the higher- and lower-teaching-period groups in their satisfaction pattern, likely because of greater exposure to refresher courses. The coefficients were not only not significant, but rather had a small negative point estimate. This does not give an empirical basis for the buffering pattern that would be predicted by a simple JD-R interpretation, but it does not indicate that PD would exacerbate the experience of high workload either, since the 95% confidence intervals included zero. At least three possible explanations. First, the teaching-period category is a limited measure of instruction and may not reflect actual workload very well. Creagh et al. (2025) describe workload as involving work intensification and time poverty across numerous tasks. Second, PD may take time, preparation, travel, or follow-up to be an immediate buffer. Compagnoni et al. (2024) reported that when PD is correlated with longer-term learning gains, it can occur on the same day as stress.

The nonsignificant main effect of the higher teaching-period category also deserves restraint. International research often finds negative associations between perceived workload and satisfaction (Eryilmaz et al., 2025; OECD, 2025), and longitudinal JD-R evidence connects demands with teacher well-being over time (Zhang et al., 2026). The current variable does not measure perceived workload, administrative burden, emotional demands, class size, or nonteaching duties. Therefore, the finding should be described as a null association for the archived teaching-period category, not as evidence that workload is irrelevant.

5.4 School Context Was More Prominent Than the Measured PD Exposure

Perhaps the most important contextual result is the ICC of .246. Approximately one quarter of job-satisfaction variance occurred between schools before covariates were added. This is substantially larger than the variance associated with the measured fixed effects and reinforces the proposition that teacher satisfaction is organizationally situated. Although the available school-level variables did not fully explain the clustering, school membership captures shared conditions that were not measured directly.

This finding aligns with recent international research. Lazcano et al. (2025) show that cooperation, stress, teacher-student relationships, and stakeholder participation operate within multilevel school structures. Hallinger et al. (2025) show through meta-analysis that leadership is meaningfully related to teacher attitudes and job satisfaction. Wu and Wu (2026) show that collaborative professional learning and organizational support operate at both the teacher and school levels.

For professional-development policy, this suggests that course provision should not be separated from the environment teachers return to. A training session can be

ineffective if teachers have limited autonomy to implement new practices, limited time to collaborate on developing them, limited leadership support, lack resources, or work in an organization that does not value experimentation. In contrast, the same content can be more resource-creating in environments where schools follow up on and share it. Future studies in Punjab should thus be conducted using the quality of professional development and the school organizational conditions simultaneously.

5.5 Implications for Professional-Development Policy and Practice

The results contradict the assumption that participation should be the key measure of professional development success. Quantitative measures such as the number of teachers trained, the number of workshops conducted, or the number of courses completed are easy to audit and are often reported as course counts. Another is differentiation by career stage. Although mean scores did not differ significantly between interaction groups, the positive experience gradient suggests that teachers with less than 15 years in the profession were less satisfied than other groups. That doesn't excuse using more general courses for less experienced teachers. In contrast, it proposes that professional support for earlier stages in the career be tailored to support specific transition issues: induction, mentoring, pedagogical confidence, access to collegial networks, clear career trajectory, and pedagogical transitions. Assess these supports directly, not by counting on course attendance. Third, professional development must be linked to workload planning. Teachers may see learning activities as additional tasks if they are not included in protected time. A PD designed as a resource must include scheduling, release time (if available), opportunities for application, and follow-up structures that replace additional work. The JD-R framework could be useful here as it focuses on the content of a resource as well as its role in the balance of demands and supports. Fourth, school-level variation means professional development strategies should build organizational capacity. Leadership support, collaboration, autonomy, and professional learning communities have been repeatedly found to be associated with positive teacher outcomes in the recent international literature (Christensen & Jerrim, 2025; Eryilmaz et al., 2026; Hallinger et al., 2025; Xie & Zou, 2025).

5.6 Methodological Contribution

The analysis also shows that multilevel modelling is an important tool for teacher research. Average professional-development coefficients could be estimated in a single-level analysis, but the large between-school variance would not be captured or explicitly included. Clustering would be an important part of the empirical structure of teacher satisfaction that would be missed by future analyses that ignore clustering. Lastly, the study demonstrates why it is important to recognize the distinction between constructs and their administrative proxies. Professional development is a broad term that includes formal PD, collaborative inquiry, coaching, mentoring, self-directed learning, professional

communities, and other activities. The present measure only includes refresher course count categories. Explicitly addressing this distinction strengthens construct validity and avoids outpacing the evidence in the policy.

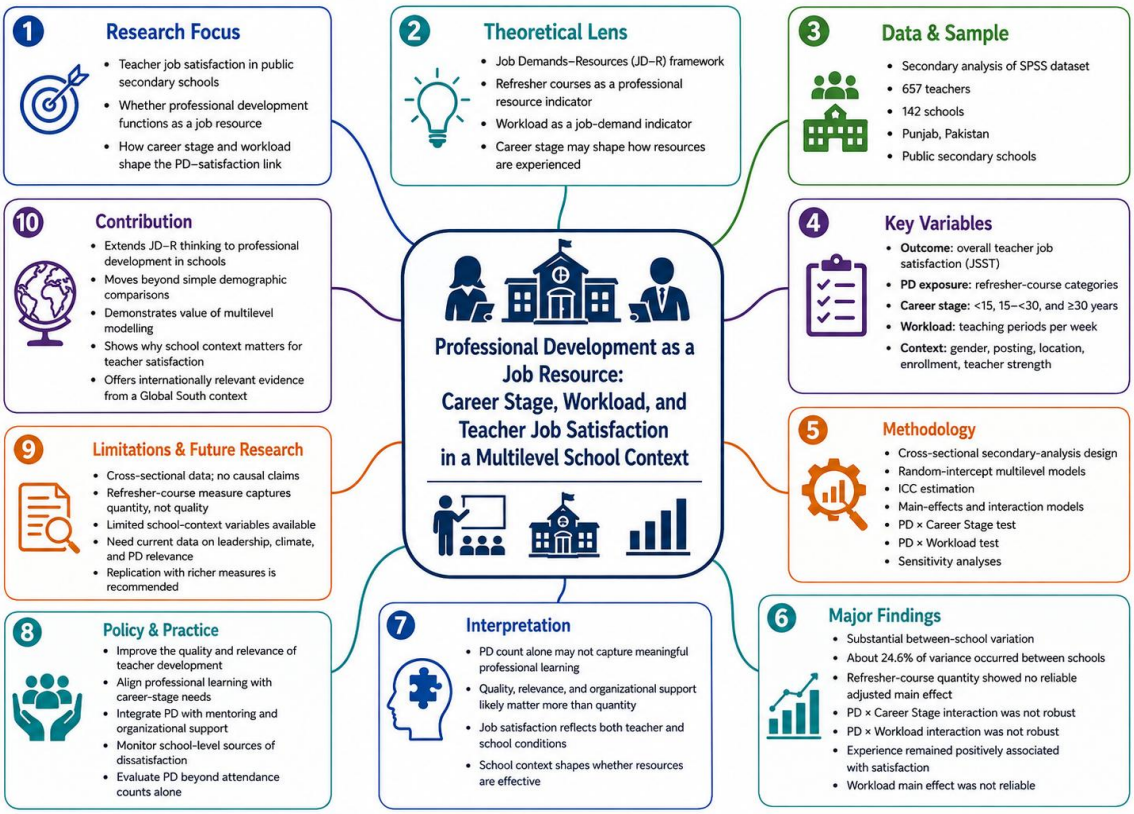
5.7 Limitations and Directions for Future Research

These coefficients are adjusted associations within the analytic sample, and not estimates of causal effects of professional development. Courses may be optional for teachers, nominated by them, or selected due to needs which are linked to satisfaction. The PD measure is coarse. The categories do not capture course quality, length, recency, content, provider, voluntary offering, perceived impact, barriers, need, or need-supply fit. Additionally, they don't distinguish between collaborative professional learning and isolated workshops. This limitation matters because some evidence suggests that quality, fit, autonomy, and collaboration matter more than numbers (Christensen & Jerrim, 2025; Kang & Mavrogordato, 2025; Leroy, 2025; Oduro & Agbale, 2026). Modern replication should therefore account for multiple dimensions of PD and, if available, relate participation levels to the school's PD framework. This workload measure is also restrictive. A binary teaching-period category cannot capture work intensification, administrative workload, marking, class size, emotional labour, student behaviour, family communication, or subjective overload. Future studies should include validated workload and stress measures and preferably time-use data. Longitudinal designs would be especially useful to separate adaptation from survivor selection. The JSST outcome is also limited because of the archive. Because the reverse-scoring key was not saved, the authors clearly attempted to reconstruct the primary scoring procedure from the wording of the items. The overall scale showed good internal consistency, but a current study needs to employ a fully documented instrument, factor structure, and measurement invariance. Some of the subscales were not sufficiently reliable for individual inferential analysis, so the question of a different relationship between professional development and satisfaction with the work, promotion, supervision, or any other aspect could not be examined. Last, the information is not meant to provide estimates of current rates of teacher satisfaction or participation in professional development. School conditions, compensation, training structures, technology, and education policy change. The benefit of this analysis is that it attempts to understand the relationships within the small number of multi-level samples available, and any theoretical question it poses regarding the quantity of participation. Current representative data and more comprehensive measures are needed to make contemporary province-wide conclusions.

6. Conclusion

In this study, it was determined if exposure to count-based professional development was a job resource in terms of teacher job satisfaction and if this relationship

was contingent on career stage or instructional workload. For each operationalization available, the answer was negative.



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