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Can Career Adaptability Protect Teachers' Work Engagement from Technostress? A Rapid Systematic Review with Implications for Early Childhood Education

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ABSTRACT

The digital transformation of schools has intensified technology-related demands on teachers, yet it remains unclear whether career adaptability can protect teachers' work engagement from technostress, particularly in early childhood education (ECE). This rapid systematic review aimed to map and synthesise empirical evidence on the relationships among technostress, work engagement, and career adaptability among teachers and to derive implications for ECE. Following PRISMA 2020 and rapid review guidance, records were identified in Scopus (n = 186) and supplemented by manual and citation searching (n = 12). Eligible studies involved teachers or educators, were primary empirical studies, and measured at least two of the three core constructs. After screening 154 records and assessing 27 full-text reports, six cross-sectional studies (N = 2,852) from China, Italy, and Pakistan were included, and their methodological quality was appraised using the JBI checklist. Evidence was most consistent for a positive link between career adaptability and work engagement (four studies), in which career adaptability acted as a predictor, moderator, or sequential mediator. Evidence on technostress was scarce: one study with notable methodological limitations reported a positive association between technostress and work engagement, and one study of inclusive preschool teachers found that digital stress reduced career adaptability. No study tested all three constructs simultaneously. Career adaptability is therefore a promising, but not yet tested, protective resource for teachers' engagement under technological demands. Longitudinal studies with ECE teachers, including in Indonesia, and interventions that strengthen career adaptability and digital competence are recommended.

Keywords : technostress, work engagement, career adaptability, teachers, early childhood education.

INTRODUCTION

Digital transformation has changed the way teachers work. Learning management systems, online administrative platforms, parent–teacher communication applications, and generative artificial intelligence (AI) have become part of teachers' daily tasks at all levels of education. On the one hand, technology opens opportunities for pedagogical innovation; on the other hand, it increases workload, blurs the boundary between work and private time, and requires teachers to continuously adjust to rapidly changing tools. The condition in which technological demands exceed an individual's capacity to cope is known as technostress, commonly described through five factors: techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty (Tarafdar et al., 2007).

A recent systematic review showed that research on teachers' technostress has grown sharply since 2018, particularly during the COVID-19 pandemic, and has consistently linked technostress with lower well-being and performance (Yang et al.,

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2025). Among K-12 teachers in the United States, for example, techno-overload, techno-invasion, and techno-insecurity increased burnout, which in turn raised turnover intention (Califf & Brooks, 2020). A similar pattern was reported among STEM teachers in China by Tu et al. (2025). In Indonesia, Dekawanti et al. (2025) found that technostress reduced the work performance of elementary school teachers in West Java, while technostress itself is shaped by psychological resources such as mindfulness and self-efficacy (Lubis et al., 2026).

Beyond these negative outcomes, research attention has increasingly shifted to the positive side of occupational well-being, namely work engagement. Work engagement is defined as a positive and fulfilling work-related state characterised by vigour, dedication, and absorption (Schaufeli & Bakker, 2004). Within the Job Demands–Resources (JD-R) framework, Bakker & Demerouti (2017) explain that job demands tend to trigger a health-impairment process, whereas job and personal resources trigger a motivational process that fosters engagement. Technostress can therefore be regarded as a job demand that is theoretically expected to erode teachers' work engagement. The systematic review of 13 studies by Sandoval-Obando et al. (2026) indeed found a consistent inverse relationship between technostress and teaching engagement, with digital self-efficacy, institutional support, emotion regulation, and meaningful work acting as protective factors.

The review by Sandoval-Obando et al. did not consider career adaptability as a personal resource. Career adaptability refers to an individual's readiness and psychosocial resources for coping with vocational development tasks, occupational transitions, and changes in the work environment, and comprises four dimensions: concern, control, curiosity, and confidence (Savickas & Porfeli, 2012). The digitalisation of education essentially requires teachers to keep adapting, which makes career adaptability conceptually relevant for explaining why some teachers remain engaged under technological demands while others become exhausted. To date, evidence on how these three constructs are related remains scattered and has not been synthesised.

This synthesis is particularly needed in early childhood education (ECE). ECE teachers now also use digital documentation and parent communication applications and have begun to adopt AI for lesson planning (Hanze, 2026). A survey of ECE teachers in Lithuania showed that technostress was present at a moderate level, driven mainly by information overload, workload, technological change, and technical problems (Slušnienė & Kesylė, 2026). Research on technostress and work engagement remains dominated by primary, secondary, and higher education teachers, so implications for ECE teachers have rarely been formulated.

Addressing this gap, the present study poses a central question: can career adaptability protect teachers' work engagement from technostress? To answer it, this study aims to map and synthesise empirical evidence on the relationships among technostress, work engagement, and career adaptability among teachers and to derive implications for ECE. A rapid systematic review was chosen for its capacity to

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provide a systematic and transparent evidence synthesis within a shorter time frame by streamlining certain steps of a systematic review (Garritty et al., 2021). The review questions were: (1) What are the characteristics of studies examining the relationships among technostress, work engagement, and career adaptability among teachers? (2) What are the direction and consistency of these relationships? (3) What role does career adaptability play in these relationships? (4) What are the implications of the findings for ECE teachers?

METHOD

Research Design

This study is a rapid systematic review reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement (Page et al., 2021). Following the guidance of the Cochrane Rapid Reviews Methods Group (Garritty et al., 2021), the review was streamlined by limiting the main search to Scopus and Google Scholar, restricting the publication period to 2016–2026 (the last ten years), and supplementing the database search with manual and citation searching.

Data Sources and Search Strategy

The main search was conducted in Scopus and Google Scholar on 23–26 September 2026 using the following keyword combinations: *technostress AND work engagement AND teachers*; *technostress AND early childhood teachers*; *career adaptability AND work engagement AND teachers*; *technostress AND work engagement*; *teacher engagement AND career adaptability*; *techno-overload AND teachers*; and *digital stress AND teachers*. The publication period was limited to 2016–2026, and only articles published in journals ranked Q1–Q4 or accredited by SINTA were retained. Retrieved records were managed and checked for duplicates before screening, and the selection process was reported using the PRISMA 2020 flow diagram. The database search was supplemented by manual searching and by backward citation searching of the reference list of the systematic review by Sandoval-Obando et al. (2026).

Eligibility Criteria

Studies were eligible if they (1) involved teachers or educators, either pre-service or in-service, at any level including ECE and higher education; (2) were primary empirical studies; and (3) measured at least two of the three core constructs, namely technostress (including digital stress), work engagement, and career adaptability, using reported instruments. Studies were excluded if (1) the participants were not teachers, or were a mixed sample of teachers and non-academic staff without separate analysis; (2) the constructs measured only resembled the core constructs, such as engagement in professional learning, pleasure in working, career commitment, or general psychological adaptability; (3) they were reviews,

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conceptual papers, corrections, or retracted articles; or (4) the full text could not be accessed.

Study Selection and Data Extraction

Study selection was conducted in two stages: title and abstract screening, followed by full-text eligibility assessment based on the criteria above. Title and abstract screening, full-text assessment, data extraction, and quality appraisal were conducted by the first author. All decisions were checked against the full texts, and borderline cases were decided by rereading the full texts against the eligibility criteria. The second and third authors checked a subset of the decisions made during the selection process. The data extracted from each study included authors and year, country, sample characteristics, design and analytic technique, instruments for each construct, and main findings relevant to the review questions. Reasons for exclusion at the full-text stage were recorded for every report.

Quality Appraisal

Methodological quality was appraised using the eight-item JBI Critical Appraisal Checklist for Analytical Cross-Sectional Studies (Moola et al., 2020). Each item was scored 1 if met (yes) and 0 if not met or unclear. Total scores of 7–8 were classified as high, 5–6 as moderate, and 0–4 as low quality. Quality ratings were not used to exclude studies but were considered when weighing the strength of evidence. A sensitivity analysis examined whether the conclusions changed when studies with additional methodological or publication-related concerns were removed.

Data Synthesis

A meta-analysis was not conducted, given the small number of studies and the heterogeneity of their designs, instruments, and analytic models. A narrative synthesis was performed by grouping findings according to the pathways between constructs (evidence mapping), namely career adaptability and work engagement, technostress and work engagement, and technostress and career adaptability. The strength of evidence for each pathway was judged by the number of studies, the consistency of findings, and methodological quality.

RESULTS AND DISCUSSION

Study Selection

The Scopus and Google Scholar searches yielded 186 records. Before screening, 21 duplicates, one record outside the publication period, nine records from journals without a quartile ranking, and one record without an abstract were removed, leaving 154 records for title and abstract screening. Of these, 134 records were excluded and 20 reports were sought for retrieval. Five reports could not be retrieved, including Ghanizadeh et al. (2026), which examined technostress and work engagement among teachers but was not accessible. Of the 15 reports assessed, 12

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were excluded for measuring only one core construct (n = 7), using an engagement measure other than work engagement (n = 2), involving a mixed academic and non-academic sample without separate analysis (n = 2), or not being primary studies (n = 1). Manual and citation searching identified 12 additional reports, of which nine were excluded and three were included. In total, six studies were included in this review (Figure 1).

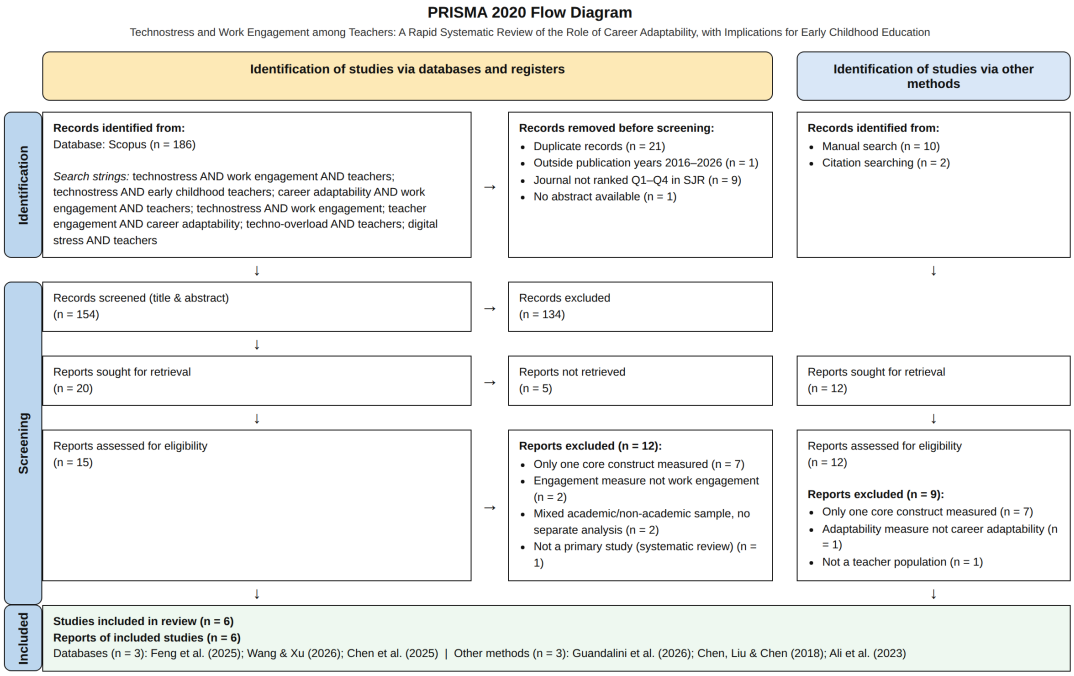


Figure 1 PRISMA 2020 Flow Diagram of Study Selection
Source: Authors' compilation (2026)

Characteristics of the Included Studies

The six included studies were published between 2018 and 2026 and involved a total of 2,852 participants (Table 1). Four studies were conducted in China, one in Italy, and one in Pakistan. The populations were diverse, comprising inclusive preschool teachers (Feng et al., 2025), preschool to secondary teachers aged 50 and above (Guandalini et al., 2026), online teachers (C. Chen et al., 2018), primary school teachers (Wang & Xu, 2026), primary and secondary school teachers (H. Chen et al., 2025), and university lecturers (Ali et al., 2023). All studies used cross-sectional designs and applied regression analysis, structural equation modelling, or latent profile analysis. Career adaptability was measured with the Career Adapt-Abilities Scale (CAAS) or its short form in five studies. Work engagement was measured with the Utrecht Work Engagement Scale (UWES) in four studies and with the Engaged Teachers Scale in one study, while technostress was measured with the Digital Stress

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Scale and the Technostress Creators Scale in one study each. No study measured all three constructs simultaneously.

Table 1 Characteristics of the Included Studies (n = 6)

Author (Year)	Country	Sample	Design and Analysis	Constructs and Instruments	Main Findings
Feng et al. (2025)	China	558 inclusive preschool teachers	Cross-sectional; chain mediation SEM	TS: Digital Stress Scale; CA: CAAS	Digital stress reduced CA (β = −0.29); CA mediated digital stress → professional compromise
Guandalini et al. (2026)	Italy	800 teachers aged ≥50 (preschool–secondary)	Cross-sectional; latent profile analysis	CA: CAAS-SF; WE: UWES-3	CA correlated positively with WE; high CA did not compensate for low organisational support
C. Chen et al. (2018)	China	299 online teachers	Cross-sectional; mediation–moderation regression	CA: CAAS; WE: UWES-9	CA predicted WE (β = 0.58); job insecurity partially mediated
Wang & Xu (2026)	China	561 primary school teachers	Cross-sectional; moderated mediation (PROCESS Model 7)	CA: CAAS; WE: UWES-17	CA moderated teaching beliefs → WE (B = 0.123)
H. Chen et al. (2025)	China	465 primary and secondary school teachers	Cross-sectional; SEM	CA: CAAS; WE: Engaged Teachers Scale	The sequential path CA → WE mediated career calling → burnout (EV = 0.176)
Ali et al. (2023)	Pakistan	169 university lecturers	Cross-sectional; regression, mediation, moderation	TS: Technostress Creators Scale; WE: UWES-17	TS correlated positively with WE (r = 0.489); computer self-efficacy moderated

Note: TS = technostress; WE = work engagement; CA = career adaptability. Source: Authors' compilation (2026)

Methodological Quality

The results of the quality appraisal are presented in Table 2. Two studies were rated high quality (Guandalini et al., 2026; Wang & Xu, 2026) and four moderate

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quality (Feng et al., 2025; C. Chen et al., 2018; H. Chen et al., 2025; Ali et al., 2023); none was rated low. The most frequent weaknesses were the absence of explicit participant inclusion criteria, largely due to convenience or platform-based recruitment (four studies), and the lack of control for potential confounders such as age, gender, or teaching experience (Feng et al., 2025; H. Chen et al., 2025). Beyond the JBI criteria, two studies raise additional concerns. Ali et al. (2023) relied on convenience sampling, did not test for common method bias, and was published in a journal whose indexing status has been questioned. C. Chen et al. (2018) is a conference paper based on teachers working for online education providers rather than formal schools. These two studies were therefore examined in the sensitivity analysis.

Table 2 Quality Appraisal of the Included Studies Using the JBI Checklist

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Score	Rating
Feng et al. (2025)	Y	Y	Y	Y	N	N	Y	Y	6	Moderate
Guandalini et al. (2026)	Y	Y	Y	Y	Y	Y	Y	Y	8	High
C. Chen et al. (2018)	U	U	Y	Y	Y	Y	Y	Y	6	Moderate
Wang & Xu (2026)	U	Y	Y	Y	Y	Y	Y	Y	7	High
H. Chen et al. (2025)	U	Y	Y	Y	N	N	Y	Y	5	Moderate
Ali et al. (2023)	N	Y	Y	Y	Y	Y	Y	U	6	Moderate

Note: Y = yes; N = no; U = unclear. Q1 = clearly defined inclusion criteria; Q2 = subjects and setting described; Q3 = exposure measured validly and reliably; Q4 = objective, standard criteria; Q5 = confounders identified; Q6 = strategies to deal with confounders; Q7 = outcomes measured validly and reliably; Q8 = appropriate statistical analysis. Source: Authors' compilation (2026)

Evidence Map of the Relationships among Constructs

Table 3 summarises the distribution of evidence across the pathways. The largest and most consistent body of evidence concerns the relationship between career adaptability and work engagement, whereas evidence involving technostress is limited to a single study per pathway. The full model linking technostress, career adaptability, and work engagement has not yet been tested.

Table 3 Evidence Map of Technostress, Career Adaptability, and Work Engagement among Teachers

Pathway	Studies	Direction of Findings	Strength of Evidence
Career adaptability → work engagement	Guandalini et al. (2026); C. Chen et al. (2018);	Consistently positive (as predictor,	Moderate: four studies (two high and two

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Pathway	Studies	Direction of Findings	Strength of Evidence
	Wang & Xu (2026); H. Chen et al. (2025)	moderator, and sequential mediator)	moderate quality), all cross-sectional
Technostress → work engagement	Ali et al. (2023)	Positive (contrary to theoretical expectation)	Very limited: one moderate-quality study with publication-related concerns
Technostress (digital stress) → career adaptability	Feng et al. (2025)	Negative	Limited: one moderate-quality study of ECE teachers
Technostress → career adaptability → work engagement	–	Not yet tested	No evidence

Source: Authors' compilation (2026)

Career Adaptability as a Resource for Teachers' Work Engagement

Four studies consistently showed that career adaptability is positively related to teachers' work engagement, although its role in the models differed. Among online teachers, career adaptability predicted work engagement directly (β = 0.58) and indirectly by reducing job insecurity, with employability strengthening this link (C. Chen et al., 2018). Among primary and secondary school teachers in China, career adaptability and work engagement formed a sequential pathway explaining how career calling reduced burnout (H. Chen et al., 2025). These findings suggest that career adaptability operates as a resource that precedes engagement: teachers who are better prepared to deal with career changes are more able to translate their motivation into actual engagement.

The other two studies revealed career adaptability as a boundary condition. Wang & Xu (2026) found that teaching beliefs increased work engagement significantly only among teachers with sufficiently high career adaptability; approximately 43.7% of teachers fell below the career adaptability threshold, for whom the pathway was not significant. Guandalini et al. (2026) showed that among older teachers, career adaptability was positively correlated with work engagement, health, and performance, yet teachers with high career adaptability but low organisational support still displayed suboptimal engagement. Career adaptability is therefore not a substitute for organisational support. Consistent with the JD-R framework (Bakker & Demerouti, 2017), personal and job resources appear to be jointly required for the motivational process to operate optimally.

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Technostress and Work Engagement: Limited and Inconsistent Evidence

Only one eligible study examined technostress and work engagement among educators. Ali et al. (2023) found a positive correlation between technostress and work engagement among university lecturers in Pakistan (r = 0.489), with computer self-efficacy moderating this relationship. This finding contradicts JD-R expectations and the synthesis by Sandoval-Obando et al. (2026), which reported an inverse relationship between technostress and teaching engagement. Studies of university employees in South Africa, which were excluded owing to samples that mixed academic and non-academic staff, also reported a negative effect of technostress on work engagement (Harunavamwe & Kanengoni, 2023; Harunavamwe et al., 2025).

These divergent findings may be explained by distinguishing challenge demands from hindrance demands. Hanze (2026) showed that among ECE teachers, technostress is double-edged: technostress appraised as a challenge promotes technology adoption and well-being, whereas technostress appraised as a hindrance undermines them. The positive association reported by Ali et al. (2023) may thus reflect technological demands perceived as challenges by lecturers with adequate computer self-efficacy. The limitations of this study and the unavailability of Ghanizadeh et al. (2026) preclude any firm conclusion for this pathway. In the sensitivity analysis, removing the two studies with additional concerns (Ali et al., 2023; C. Chen et al., 2018) did not change the main conclusions: the positive link between career adaptability and work engagement remained supported by three studies of moderate to high quality, and the technostress–work engagement pathway remained inconclusive.

Technostress and Career Adaptability: Evidence from ECE Teachers

The only study linking digital stress with career adaptability involved 558 inclusive preschool teachers in China (Feng et al., 2025). Digital stress reduced career adaptability ($\beta = -0.29$) and increased the tendency towards professional compromise. Career adaptability mediated this relationship, and a sequential pathway was identified whereby negative automatic thoughts subsequently reduced career adaptability. This finding is important in showing that technostress not only burdens teachers but may also erode the very personal resource that has been shown to sustain their engagement.

The Role of Career Adaptability: A Tentative Integrative Model

Combining the findings across the three pathways yields a tentative integrative model. As a job demand, technostress may reduce career adaptability (Feng et al., 2025), whereas career adaptability consistently supports work engagement (C. Chen et al., 2018; P. Chen et al., 2025; Guandalini et al., 2026; Wang & Xu, 2026). Career adaptability may therefore act as a mediator that explains why technostress reduces engagement, and as a moderator that determines whether technological demands are appraised as challenges or hindrances. The boundary

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conditions identified include organisational support (Guandalini et al., 2026), job insecurity (C. Chen et al., 2018), and computer self-efficacy (Ali et al., 2023). In answer to the question posed in the title, the current evidence suggests that career adaptability is a plausible protective resource, but its protective role against technostress has not yet been directly tested. The model should therefore be read as a hypothesis for future research rather than as an established conclusion.

Implications for Early Childhood Education

It should be noted that only one of the six included studies focused exclusively on ECE teachers (Feng et al., 2025), and one further study included preschool teachers within a mixed sample (Guandalini et al., 2026). The implications below were therefore derived from evidence on teachers in general and strengthened by supporting studies on ECE teachers. With this caveat, the findings carry several implications for ECE. First, digital stress among ECE teachers should be viewed as a risk to teachers' career resources rather than merely a technical problem, given that it can reduce career adaptability and encourage professional compromise (Feng et al., 2025). Second, ECE institutions can reduce the most frequently reported technostress creators, namely information overload, digital administrative workload, and technical problems (Slušnienė & Kesylė, 2026), and frame the adoption of new technologies as a supported challenge through training (Hanze, 2026). Third, self-efficacy and professional support predict ECE teachers' work engagement (Lipscomb et al., 2022), which suggests that efforts to strengthen career adaptability should be combined with tangible organisational support. Fourth, career adaptability can be developed during pre-service ECE teacher education through career exploration and the strengthening of professional identity (Zhao et al., 2022; Wang et al., 2022), so that ECE teacher education programmes may incorporate career adaptation competencies alongside digital competencies.

Agenda for Future Research

The gaps identified in this review point to three research priorities. First, the tentative integrative model should be tested empirically among kindergarten teachers. The evidence supports both a buffering and an explanatory role, so career adaptability should be examined as a moderator that weakens the negative association between technostress and work engagement and as a mediator through which technostress reduces engagement (Feng et al., 2025; Wang & Xu, 2026). A moderator should ideally be independent of the predictor; such studies should therefore report the correlation between technostress and career adaptability and, where possible, test moderation and mediation within a single model. Second, technostress should be measured by dimension, namely techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty, and challenge and hindrance appraisals should be distinguished, given the positive association reported by Ali et al. (2023) and the double-edged effects identified by

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Hanze (2026). Third, time-lagged or longitudinal designs, validated Indonesian versions of the CAAS, UWES, and technostress scales, adequate sample sizes, control for organisational support and demographic characteristics, and tests for common method bias are needed.

In the Indonesian context, such research should capture the digital demands specific to ECE teachers, including data reporting through national education information systems, digital documentation of child development assessments, participation in online professional development platforms, and communication with parents through messaging applications. Future reviews should also be updated as new studies emerge, extend the search to additional international and national databases, include ECE-specific search terms such as kindergarten, preschool, and early childhood teacher, and involve at least two independent reviewers.

Limitations

This review has several limitations. The main search was limited to Scopus and Google Scholar, so studies indexed in other databases, including national journals, may have been missed. One highly relevant report could not be accessed. All included studies used cross-sectional designs, preventing causal inference, and most were conducted in China, so generalisation to other contexts, including Indonesia, should be made with caution. The instruments used were also heterogeneous. Screening, data extraction, and quality appraisal were conducted mainly by the first author, with a subset of decisions checked by the second and third authors; although all decisions were checked against the full texts, selection or appraisal errors cannot be ruled out. One included study was also published in a journal with a questioned indexing status.

CONCLUSION AND SUGGESTIONS

This rapid systematic review identified six studies examining at least two of three constructs, namely technostress, work engagement, and career adaptability, among teachers. The most consistent evidence indicates that career adaptability is positively related to work engagement, acting as a predictor, moderator, or sequential mediator, although its role depends on organisational support. Evidence on technostress remains very limited is one study with notable limitations found a positive association between technostress and work engagement, and one study of ECE teachers found that digital stress reduced career adaptability. No study has tested the three constructs simultaneously, so the role of career adaptability in the relationship between technostress and teachers' work engagement remains a promising hypothesis.

Several suggestions follow from these findings. For researchers, the most urgent step is a quantitative study among kindergarten teachers, particularly in Indonesia, that tests whether career adaptability moderates, and possibly mediates, the relationship between technostress and work engagement, using dimension-level measures of technostress and time-lagged designs. For future reviews, the evidence

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map should be updated with searches across more international and national databases and with independent double screening. For practice, ECE institutions and teacher education programmes are encouraged to reduce unnecessary digital administrative burdens and to develop interventions that combine digital competence development, career adaptability training, and adequate organisational support so that teachers remain engaged amid digital transformation.

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