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Mediating roles of college teaching self-efficacy in job stress and job satisfaction among Chinese university teachers

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Colleges and universities have been experiencing high rates of faculty turnover across countries, and hiring and retaining influential faculty members is a constant challenge that higher education institutions have encountered. Job stress and job satisfaction are stable predictors that psychologically determine teachers' persistence in their institutions. The present study aimed to extend understanding of a mediating effect of college teaching self-efficacy (CTSE) on the relationship between faculty job stress and job satisfaction. Data collected from 455 Chinese university teachers were analyzed using structural equation moderated mediation models. CTSE was an effective mediator in alleviating the negative relationship between job stress and job satisfaction. Our finding from a moderated mediation model suggests that the mediation effect of CTSE did not differ by teaching experience, ranks, gender, and workload. However, the significant covariate effect of teaching experience incorporated in the mediation effect implies that teachers with more teaching experiences may have greater teaching self-efficacy, which may positively change the perceptions of job stress and job satisfaction. By way of discussion, we provided evidence regarding current trends and underlying psychological reasons for university teachers' dissatisfaction which might be useful for educators, university administrators, and policymakers framing policy and institutional decisions. Some impractical implications are further discussed.

KEYWORDS

job stress, teaching self-efficacy, job satisfaction, social cognitive theory, structural equation modeling

Introduction

Colleges and universities have been experiencing high rates of faculty turnover across countries, and hiring and retaining influential faculty members is a constant challenge that higher education institutions have encountered (Wong and Heng, 2009; Finch et al., 2010). This issue may involve intricate underlying mechanisms. However, job stress and job satisfaction are stable predictors that psychologically determine teachers' persistence in their professions and institutions (Klassen and Chiu, 2011; Gardner, 2012; Ryan et al., 2012;

You, 2014; Calkins et al., 2019; Gonzales et al., 2020; Madigan and Kim, 2021; Al'Abri et al., 2022; Li et al., 2022).

Teachers and researchers in higher education have increasingly suffered from stress due to the intense demands for productivity and the complexity of the work (Graça et al., 2021). The situation is even harsher for Chinese university teachers because universities and colleges have raised expectations for teaching and research competitiveness, leading to high levels of stress, depressive symptoms, emotional exhaustion, and turnovers among university teachers (You, 2014; Yin et al., 2020; Han et al., 2021; Yu et al., 2022). Han et al. (2021) found that teachers who experienced intense stress from organizational practice harmed job satisfaction. According to a survey study in 2013, 36% of Chinese university teachers experienced great stress (Liu and Zhou, 2016), which deteriorated their job satisfaction (Gao et al., 2015; Liu and Zhou, 2016; Wang et al., 2020). Given the critical roles of university teachers in current educational systems (Chu et al., 2021; Coombe et al., 2021; Fathi et al., 2021), psychological understanding is now a substantial and foundational matter in approaching university teachers' retention and productivity and in helping them deal with the stressful environment and thrive in their career progression.

Teaching self-efficacy, also called teacher self-efficacy, is a well-known mechanism that can alleviate job stress and promote job satisfaction and further job retention by mitigating the negative impact of environmental obstacles and job stress (e.g., Klassen and Chiu, 2010, 2011; Li et al., 2017; Troesch and Bauer, 2017; Ismayilova and Klassen, 2019; Yin et al., 2020). Numerous studies found that teaching self-efficacy significantly predicted teacher job satisfaction in K-12 school settings (Klassen and Chiu, 2010; Sun and Xia, 2018; Zakariya, 2020; Ortan et al., 2021; Saks et al., 2021; Richter et al., 2022). Despite the attention to the relationship among teachers' job satisfaction, job stress, and teaching self-efficacy in K-12 school settings (Tschannen-Moran and Hoy, 2007; Skaalvik and Skaalvik, 2014), a mediating role of teaching self-efficacy has not been much scrutinized with diverse samples of teachers in higher education, particularly in non-Western cultural settings (Klassen and Chiu, 2010; Yin et al., 2020). Further, differential effects of contextual variables (e.g., teaching experience, rank, gender) surrounding university teachers have not been sufficiently investigated in such relationships.

Considering that teaching self-efficacy is associated with positive outcomes, such as teacher well-being (Bjorklund et al., 2021; Saks et al., 2021; Jaguaco et al., 2022; Song, 2022), quality of working life (Kong, 2021; Jaguaco et al., 2022; Matos et al., 2022), and job satisfaction (Chan et al., 2020; Zakariya, 2020), the present study aims to investigate a mediating role of college teaching self-efficacy (CTSE) as a mechanism underlying the relationship between job stress and job satisfaction. We further examined the effect of contextual variables such as gender, teaching experiences, ranks, and teaching loads to forge an understanding of the relationship. Our target population was Chinese university teachers, referring to those involved in teaching at higher education institutions as professors, lecturers, and instructors. This target population was ideal for examining the robust relationship among job stress, CTSE, and job satisfaction in a non-Western culture, given that university and college faculty members' stress and turnover issues are also prevalent and severe in China (Liu, 2007; You, 2014). We thus aimed to extend a clearer understanding of how CTSE can serve as a psychological mechanism for job satisfaction among Chinese university teachers.

The present study is grounded on the job satisfaction model of social cognitive career theory (SCCT: Lent et al., 1994; Lent and Brown, 2006), which provides a framework for understanding the interplays among self-efficacy, work conditions, and satisfaction a person's experiences in career pathways. The job satisfaction model explains five variables, including personality and affective traits, self-efficacy expectations, goal-directed activity, efficacy-relevant environmental resources and barriers, and work conditions to predict one's experience of satisfaction in work settings (Lent and Brown, 2006). Self-efficacy beliefs are the central part of the model, which refers to beliefs in one's capabilities to finish the courses of action and produce expected attainments (Bandura, 1997). Self-efficacy influences an individual's resilience to adversity, the level of stress they can bear, and their accomplishments (Bandura, 1997). Such beliefs link to intrinsic motivation and behaviors to accomplishment as well as persistence and coping ability when they face difficulties (Peng and Mao, 2015), improving their job satisfaction.

The job satisfaction model (Lent and Brown, 2006) provides a unifying framework for understanding self-efficacy and work conditions' influences on job satisfaction. According to the model, job satisfaction is expected for those who strongly believe in their capability to accomplish job tasks under favorable work conditions. Job satisfaction is a personal gratification from one's different aspects of the work environment (Weiss et al., 1967). Work conditions and characteristics are associated with job satisfaction, including role stressors (e.g., work conflict, overload) and work events, which may influence job satisfaction and self-efficacy. The model emphasizes the human agent's role in its contribution to job satisfaction and tries to understand how affective traits, other personal factors, and environmental factors work together to influence job satisfaction, thus helping people become satisfied with their job (Lent and Brown, 2006).

Literature review and hypotheses

In higher education, university teachers' job satisfaction promotes teaching quality and research productivity (Chen, 2011; He et al., 2020). University teachers' job performance determines the quality of student satisfaction and affects student learning (Machado-Taylor et al., 2016). Conversely, faculty job dissatisfaction diminishes morale, results in turnover intention, and decreases research productivity (Johnsrud and Rosser, 2002; Seifert and Umbach, 2008; Zhang and Shen, 2017). Lawrence et al. (2012) demonstrated that faculty who experienced job satisfaction were more likely to report higher levels of organizational commitment and organizational citizenship behaviors. Other

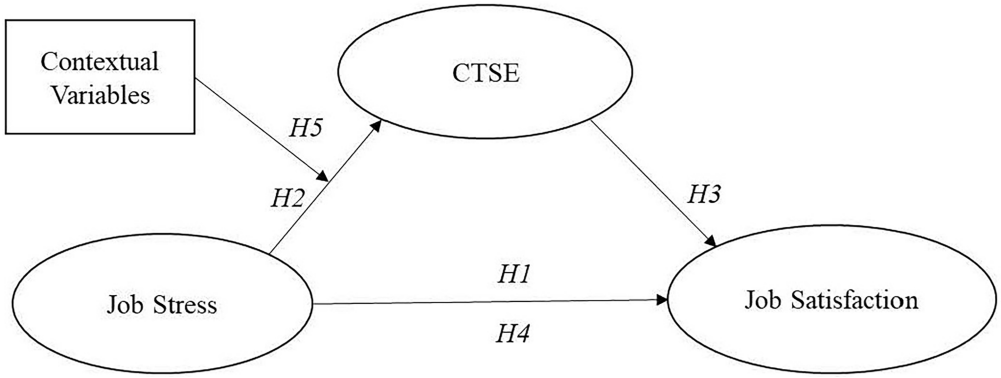

FIGURE 1
Hypothetical mediation model of college teaching self-efficacy. CTSE=college teaching self-efficacy; Contextual variables include teaching experience, gender, rank, and workload.

studies also showed that improving teachers' job satisfaction significantly reduced their attrition rates and intentions to leave their profession (Klassen and Chiu, 2011; Martin et al., 2012; Klassen and Tze, 2014; Toropova et al., 2021).

Given the well-established SCCT job satisfaction model and replications of empirical studies, we hypothesize that a mediation model of CTSE on the relationship between job stress and job satisfaction (Figure 1) would significantly explain Chinese university teachers' psychological mechanism in their workplaces. Five specific hypotheses (*H1* to *H5*) were postulated and evaluated in the present study, which is explained below in detail.

Job stress and job satisfaction

Job stress is a critical factor that determines faculty job satisfaction. Teachers' job stress often results from several contextual predictors, such as increasing workloads, inadequate time, discipline problems, insufficient resources, lack of professional recognition, insufficient administrative support, and the diversity of tasks required (Kokkinos, 2007; Berryhill et al., 2009; Fütterer et al., 2022), which consequently influence the quality of education such as lower job satisfaction (Collie et al., 2012), reduced teaching self-efficacy (Klassen et al., 2013), job burnout (Wang et al., 2020), and increased rate of teacher attrition (Skaalvik and Skaalvik, 2011).

In higher education, very few studies were conducted on the direct relationship between faculty job stress and job satisfaction; but it is known that job stress explains faculty turnover, performance, and professional commitment, which are closely associated with job satisfaction (Tytherleigh et al., 2005; Catano et al., 2010; Ryan et al., 2012; Al'Abri et al., 2022). Changing work conditions and environments in higher education, such as increasing levels of managerial control, higher work demands, and job insecurity, may result in increases in faculty job stress at academic workplaces, and faculty experienced exceedingly high levels of stress even by those who were satisfied with their jobs (Kinman and Jones, 2008; Ablanedo-Rosas et al., 2011; Shin and Jung, 2014). Catano et al. (2010) found that lack of control in workplaces predicted job dissatisfaction and psychological strain, and job insecurity and work-life imbalance led to job dissatisfaction. Therefore, the deteriorating working conditions of higher education institutions forces faculty to face increasing workloads, growing pressure to publish papers, and short-term contracts, which contribute to rising job stress (Jacobs and Winslow, 2004; Tytherleigh et al., 2005; Houston et al., 2006; Dickson-Swift et al., 2009).

Chinese university teachers also experienced high job stress (Li and Kou, 2018; Han et al., 2021), which negatively influenced their job satisfaction (He and Liu, 2012; Gao et al., 2015; He, 2015). Job stress among Chinese university teachers was also significantly linked to job insecurity, lack of control and resources, increasing student enrollment, and high demands for research productivity and grants (Jing, 2008; Sun et al., 2011). University teachers with higher job stress experienced higher job burnout (Li, 2018). A recent study (Wang et al., 2020) with 1, 906 university teachers in China showed that job stress negatively influenced job satisfaction but mediated the negative relationship between job stress and organizational commitment. Prior research on teachers' job satisfaction found a robust relationship between job stress and job satisfaction across various samples. Thus, our first hypothesis is that university teachers' job stress is negatively related to job satisfaction (H1).

Job stress and CTSE

Accumulated empirical evidence exists concerning the negative relationship between teachers' job stress and teaching self-efficacy beliefs. Although gains in teaching self-efficacy do not guarantee the reduction of job stress (Klassen and Durksen, 2014), many researchers replicated the negative correlations between the two constructs with a variety of samples (Klassen and Chiu, 2011; El-Sayed et al., 2014; Hu et al., 2019; Han et al., 2021). El-Sayed

et al. (2014) found that 84.6% of the faculty members in an Egyptian university experienced a high level of occupational stress, which negatively influenced self-efficacy. Yin et al. (2020) examined the relationship between Chinese university teachers' job stress and their self-efficacy beliefs, showing that stress from organizational inadequacy and new challenges negatively influenced teaching self-efficacy, while stress derived from financial inadequacy and poor student quality positively influenced teaching self-efficacy. Another study on Chinese university teachers found that stress related to organizational practices was negatively associated with self-efficacy (Han et al., 2021). Fathi and Derakhshan (2019) examined the role of teacher self-efficacy and emotional regulation as predictors of teaching stress among Iranian teachers in different language institutes, schools, and universities. The results showed that teacher self-efficacy and emotional regulation negatively predicted teaching stress, and self-efficacy outweighed emotional regulation in predicting teaching stress. Therefore, the second hypothesis is that job stress is negatively related to CTSE (H2).

CTSE and job satisfaction

Teachers with greater self-efficacy put more energy into their job, have higher levels of job satisfaction, and develop interpersonal networks to sustain their job satisfaction (Caprara et al., 2006; Klassen et al., 2013; Perera et al., 2019; Alibakhshi et al., 2020; Gonzales et al., 2020; Toropova et al., 2021). Extensive research found a positive correlation between teaching self-efficacy and job satisfaction among K-12 teachers (Klassen and Chiu, 2010; Soto and Rojas, 2019; Zakariya, 2020).

Richter et al. (2022) examined retention intention and job satisfaction among first-year alternatively certified teachers in German. The results revealed that teacher extraversion and self-efficacy positively affected job satisfaction, and self-efficacy mediated the relationship between teacher extraversion and job satisfaction. Toropova et al. (2021) investigated the relationship between teacher job satisfaction, school working conditions, and teacher characteristics for eighth-grade mathematics teachers in Sweden. The results showed that teachers with more exposure to professional development and more efficacious teachers tended to have higher levels of job satisfaction. Recent studies also found a positive relationship between teaching self-efficacy and job satisfaction among teachers in China (Wang et al., 2015; Li et al., 2017), Iran (Alibakhshi et al., 2020), Norway (Zakariya, 2020), and Philippine (Gonzales et al., 2020). However, studies on teaching self-efficacy and job satisfaction at the university level are minimal. Ismayilova and Klassen (2019) found that teaching self-efficacy was the strongest predictor of job satisfaction among university faculty in Azerbaijan and Turkey. Frisby et al. (2015) examined the effect of students' instructional dissent on faculty burnout, commitment, satisfaction, and self-efficacy. However, this study did not show the relationship between faculty self-efficacy and job satisfaction.

Despite a lack of studies with university teacher samples, we postulated the third hypothesis based on robust findings concerning the positive relationship between CTSE and job satisfaction. We expect that CTSE predicts and positively influences Chinese university teachers' job satisfaction (H3).

In addition to the positive relationship between CTSE and job satisfaction, we further assume that CTSE would undermine the negative relationship between job stress and job satisfaction. According to Bandura's social cognitive theory, people have their own beliefs in their ability to engage in activities to develop themselves (Bandura, 1997), which plays a crucial role in changing human behaviors and circumstances. Studies demonstrated that people with firm self-efficacy beliefs were more likely to cope effectively with complex problems and pursue their goals persistently, thus improving their job satisfaction (Peng and Mao, 2015). Faculty members' job stress often has negative impacts on job satisfaction (He and Liu, 2012; Gao et al., 2015; Han et al., 2021) and may result in faculty member's decision to leave their institution (Johnsrud and Rosser, 2002; Rosser, 2004). However, teaching self-efficacy positively correlates with work engagement and reflection (Fathi et al., 2021; Han and Wang, 2021) and job satisfaction (Klassen and Chiu, 2010; Perera et al., 2019; Toropova et al., 2021; Richter et al., 2022). Pajares (2002) claimed that individuals with a higher sense of efficacy are more likely to challenge difficulties and adopt effective coping strategies to undergo stress. Therefore, self-efficacy beliefs may help undermine the negative effect of job stress on job satisfaction. Collie et al. (2012) found that elementary teachers' job stress from heavy workloads negatively influenced their job satisfaction, and teachers who felt stressed by student behavior had lower teaching efficacy. Therefore, our fourth hypothesis is that CTSE would undermine the negative relationship between job stress and job satisfaction (H4).

Contextual variables affecting job satisfaction model for university teachers

Based on the SCCT job satisfaction model (Lent and Brown, 2006), we assume that teaching experience, gender, rank, and workload may be related to job-related beliefs and job satisfaction.

Teaching experience is considered an essential predictor of teaching self-efficacy beliefs and job satisfaction. An abundance of empirical studies on this topic found a positive relationship between the two variables, showing that teachers with more teaching experience had higher self-efficacy beliefs (Fives et al., 2007; Wolters and Daugherty, 2007; Liu, 2014). Cheung (2008) stated that the length of teaching experiences was a significant source of Chinese primary in-service teachers' self-efficacy. Gurvitch and Metzler (2009) proposed that pre-service teachers' self-efficacy beliefs were raised as their teaching experience increased. Dimopoulou (2014) found that teachers with more years of teaching reported higher levels of teaching self-efficacy in special schools in the United Kingdom. Fives et al. (2007) found

that student-teacher self-efficacy increased significantly over the 12-week course of student-teaching practicum. Liu (2014) conducted a study on Chinese university teachers who teach English as a second language and found that teachers with more than 20 years of teaching experience had greater self-efficacy than those with less teaching experience. Another study showed that teachers with more than 11 years of teaching experience reported a higher level of self-efficacy than those with less than 11 years of experience (Wolters and Daugherty, 2007).

However, some studies implied that the relationship between teaching experience and teaching self-efficacy is insignificant or nonlinear (e.g., Klassen and Chiu, 2010; Tschannen-Moran and Johnson, 2011). Perera et al. (2019) found that teachers with more years of experience reported different self-efficacy beliefs among Australian secondary school teachers, with some belonging to a highly efficacious group but some being highly inefficacious. Given the contradictory findings, the relationship between teaching experience and teaching self-efficacy needs further investigation, particularly for university teachers, as this group seldom gets attention in the literature.

The effects of gender and workload on teaching self-efficacy beliefs have also been examined in various cultural contexts, including China and Australia (Liu, 2014; Perera et al., 2019). Male teachers are more likely to report inefficacious, while females report highly to moderately efficacious in classroom instruction (Perera et al., 2019). Liu (2014) found that male teachers experienced lower self-efficacy beliefs than females in China.

Studies showed that university faculty's job satisfaction differs in gender (Okpara et al., 2005; Sabharwal and Corley, 2009; Toker, 2011; Gardner, 2012) and rank (Zhou and Volkwein, 2004; Bozeman and Gaughan, 2011; Gao et al., 2015), with male and tenured experiencing a higher level of job satisfaction. However, Gao et al. (2015) found that male and female faculty in China showed no difference in job satisfaction. Excessive workload negatively affects faculty job satisfaction (Love et al., 2010; Mamiseishvili and Rosser, 2010).

Based on the above literature, the effect of covariates on teaching self-efficacy beliefs and job satisfaction is not apparent and needs further examination. In the present study, we examine the effect of teaching experience, gender, workload, and rank on the relationship between job stress, teaching self-efficacy, and job satisfaction. We hypothesize that the mediation effect of CTSE will differ by contextual variables, including teaching experience, gender, rank, and workload (H5).

Methods

Procedure

We recruited the study participants *via* a social media platform in cooperation with staff and faculty members in colleges and universities in China. The participation was completely voluntary and anonymous, which was highlighted in the invitation letter. The College Working Stress Scale is originally in Chinese. The Chinese short form of the Minnesota Satisfaction Questionnaire (Weiss et al., 1967) is available by the original authors of the scale, so we used it to measure job satisfaction. Since one of the questionnaires, the College Teaching Self-Efficacy Scale (CTSES: Liu et al., 2020), is not available in Chinese, we translated it into Chinese and back-translated it into English by two professors in the United States and two university teachers in China. A Ph.D. student majoring in translation between English and Chinese checked the result of translation and back-translation. All questions in the Chinese version of the survey were then utilized to collect data, and a total of 68 items took the participants approximately 20 min to finish the survey. We approached nearly 700 university teachers, and the response rate was approximately 66.29%.

Participants

The final sample consisted of 455 university teachers in China, who are operationally defined as those involved in teaching at universities: 49.45% lecturers, 32.97% associate professors, 5.93% full professors, and 5.5% assistant instructors. An assistant instructor in China is a member who assists other teachers in their teaching work (Liu, 2018). Participants' teaching experience varied between 1 and 45 years ($M = 13.48$, $SD = 7.26$), and the time ratio of teaching to research ranged from 5 to 100% ($M = 63.43\%$, $SD = 21.28$). Participants reported their biological sex as 43.52% males and 56.48% females. Almost half of the participants (55.72%) were recruited from Anhui Province, and the others from different provinces (e.g., Shanxi, Zhejiang, Jilin) in China. The sample included participants with bachelor's degrees ($n = 10$, 2.20%), master's degrees ($n = 246$, 54.10%), doctorate degrees ($n = 148$, 32.50%), and postdocs ($n = 33$, 7.30%).

Measures

College teaching self-efficacy

College teaching self-efficacy was measured using 17 items of the College Teaching Self-Efficacy Scale (CTSES: Liu et al., 2020 [details removed for review]) which measures college teachers' beliefs about their ability to accomplish teaching tasks (Appendix A). Participants were asked to rate their confidence about teaching-related tasks on a scale ranging from 0 (*no confidence at all*) to 100 (*completely confident*). A sample item for CTSES is "how confident are you in your ability to motivate students to remain actively engaged in learning activities?" The Cronbach's alpha reliability of the one-factor scale in the present study was 0.95. A higher score represents a high level of college teaching self-efficacy.

Job stress

Job stress was measured using the College Working Stress Scale (CWSS: Li, 2005), which was designed to assess university

teachers' levels of job stress (Appendix B) CWSS consists of 24 items, rated on a five-point Likert scale ranging from 1 (*no stress*) to 5 (*extreme stress*). A sample item is "please rate how great a source of stress these factors are for you: an opportunity for promotion." The scale reflects five dimensions of job stress: job security, teaching-related job security, interpersonal relationships, workload, and work pleasure. Li (2005) showed that CWSS has solid internal consistency reliability of all items ($\alpha = 0.92$). Extensive prior research demonstrates adequate internal consistency reliability (α=0.81 to 0.91) and construct validity evidence for CWSS in the research in China (He and Liu, 2012; Ni et al., 2016; Wang and Jing, 2019).

Job satisfaction

Job satisfaction was measured using a short-form Minnesota Satisfaction Questionnaire (MSQ: Weiss et al., 1967; Appendix C). The MSQ is also available in many languages, including Chinese; thus, we used the Chinese short form of MSQ. The short-form MSQ consists of 20 items, rated on a five-point Likert-type scale (1 = *very dissatisfied*, to 5 = *very satisfied*). A sample item for the scale is rating "how satisfied with your job on a 5-point response scale: the competence of my superior in making decisions." Two factors were originally suggested; intrinsic job satisfaction includes 20 items, extrinsic job satisfaction includes eight items, and the general satisfaction score is also widely used. Extensive prior research demonstrates adequate internal consistency reliability and construct validity evidence for MSQ (Weiss et al., 1967; Saner and Eyüpoğlu, 2013; Pan et al., 2015). We used the general satisfaction score, the composite score of the whole items, and a higher score represents a higher level of teacher satisfaction.

Contextual variables

Demographic information was asked to answer, including gender, professional rank, workload, and years of experience. The teaching experience was measured as the number of years teaching at the college level cumulatively. The workload was indexed as the percentage of semester workload teachers spent on teaching work. Teachers were also asked to report their gender on a binary response scale (0 = female, 1 = male). Finally, faculty members' rank was indexed as four categories (1 = assistant instructor, 2 = lecturer, 3 = associate professor, 4 = full professor).

Statistical analyses

Data cleaning

The careless response is a pattern of responses in which participants respond without thinking of the item content (Meade and Craig, 2012), resulting in serious bias, particularly in online surveys. We identified careless responses based on out-of-range values, speed of response time, and excessively the same responses on consecutive items (e.g., rating only "3" on the whole survey pages). Consequently, we deleted the careless or inattentive responders from the data set, resulting in 455 participants for further analyses. We also examined normality, linearity, homoscedasticity, and multicollinearity to check the assumptions for the multivariate statistical analyses. We found that all the assumptions were met by checking the normality histogram, Q-Q plot, scatterplot, and tolerance value.

Preliminary analysis – Measurement models

Before analyzing the mediation structural equation model, we tested the measurement models embedded in the structural equation model (SEM) for mediation analysis. Since the CTSE scale (Author, 2020) has not been validated with a sample of university teachers in China, we performed exploratory factor analysis first (EFA) to explore the factor structure. Parallel analysis (Horn, 1965) was performed using the R Paran package (Dinno, 2001-2009) to determine the number of factors comparing simulated and the actual data. We also conducted confirmatory factor analysis (CFA) for all the latent variables of the mediation model and examined if the data supported the hypothesized factor structure.

Mediation and moderated mediation analysis

The SEM mediation analysis based on bootstrapping was incorporated to examine the first four hypotheses (*H1 – H4*) using Mplus 8.8 (Muthén and Muthén, 1998–2022). Testing the indirect effect by bootstrapping or Monte Carlo methods is recommended rather than testing individual paths of the simple mediation model (Hayes and Rockwood, 2017). The previous methods, such as the Sobel test and the ratio of the paths of ab to c, are not recommended because of their unclear interpretability and inaccurate results. Thus, we relied on the indirect effect with the bootstrap confidence interval to test the significance of the hypothesized mediation effect. In our model, the mediation effect indicates the effect of job stress on job satisfaction depending on the effect of CTSE. The indirect effect was computed by bootstrapping from each resampled data set, and a confidence interval was produced to decide the indirect effect (Preacher and Hayes, 2004, 2008).

After examining the mediation effect, we continued to examine if the mediation effect was conditional on the level of teaching experience. Moderated mediation analysis (Preacher et al., 2007) was used, in which the interaction term of CTSE and teaching experience was additionally included in the mediation model. Before examining the moderating effects on the mediation model, these covariates were exploratorily specified to regress the mediator without interaction terms. Based on this baseline result, we added teaching experience as a moderator in the mediation model and analyzed a moderated mediation using the XWITH statement in Mplus syntax.

We evaluated the model fits based on multiple goodness-of-fit indices, including the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Square Residual (SRMR), the Tucker Lewis Index (TLI), and the Comparative Fit Index (CFI). The following criteria were used to determine the adequateness of the model fits: RMSEA $\leq$0.08, CFI > 0.90, TLI > 0.90, and SRMR $\leq$0.05 (Bentler, 1990; McDonald and

Marsh, 1990; Browne and Cudeck, 1992; Hu and Bentler, 1999; Brown, 2015). As seen in Figure 1, we specified the direct and indirect effects of the three main variables (mediation model) and the covariates (moderated mediation model) and estimated the parameters with bootstrapping (Preacher and Hayes, 2004, 2008). Full information maximum likelihood (FIML) estimation was used to handle missing data (Enders, 2010).

Results

Preliminary analysis: Measurement models

College teaching self-efficacy

Figure 2 presents the parallel analysis result, where the eigenvalues of the actual data are contrasted with the average eigenvalues of the simulated parallel data. The actual data line drops below the simulated data line at Factor 3. By comparing the eigenvalues obtained from the simulated data with the eigenvalues from the actual data, the parallel analysis recommended two factors in the CTSE scale. We further conducted CFA with a robust maximum likelihood estimator (MLR) based on the hypothesized two-factor model. The two-factor CTSE scale demonstrated acceptable model fit: $\chi^2(118) = 306.98$, $p < 0.001$, CFI = 0.938, TLI = 0.929, SRMR = 0.035, and RMSEA = 0.060, 90% CI [0.052, 0.068]. Standardized factor pattern loadings ranged from 0.74 to 0.87. However, the factor correlation was too high, $r = 0.99$, implying that the two factors are not clearly distinguished. We further examined the one-factor model combining the two factors, resulting in acceptable model fits: $\chi^2(119) = 307.25$, $p < 0.001$, CFI = 0.939, TLI = 0.930, SRMR = 0.035, and RMSEA = 0.060, 90% CI [0.051, 0.068]. We referred to modification indices for a more parsimonious and effective factor model and found that seven items were redundant in the one-factor model. Consequently, we deleted the seven items, and the model fits with the reduced model, which were notably improved: $\chi^2(77) = 173.01$, $p < 0.001$, CFI = 0.959, TLI = 0.952, SRMR = 0.031, and RMSEA = 0.053, 90% CI [0.042, 0.063]. The Cronbach's α for the final 10 items of the one-factor CTSE scale was 0.95.

College working stress scale

The CFA results for the original five-factor model yielded unacceptable model fits: $\chi^2(242) = 742.48$, $p < 0.001$, CFI = 0.89, TLI = 0.87, SRMR = 0.06, and RMSEA = 0.07, 90% CI [0.062, 0.073]. Factor loadings and modification indices implicated a need to combine the five factors into a smaller number of factors, mainly considering the strong correlations among the factors. Therefore, we decided to combine the five factors into three factors: job security, interpersonal relationship, and work pleasure. After deleting 10 items, the job stress scale demonstrated acceptable model fit: $\chi^2(74) = 185.223$, $p < 0.001$, CFI = 0.940, TLI = 0.926, SRMR = 0.044, and RMSEA = 0.058, 90% CI [0.047, 0.068]. The Cronbach's α for job security, interpersonal relationship, and work pleasure were 0.74, 0.78, and 0.84, respectively. Cronbach's alpha with all factors was $\alpha = 0.89$. The factor correlations are 0.78, 0.90, and 0.87, respectively.

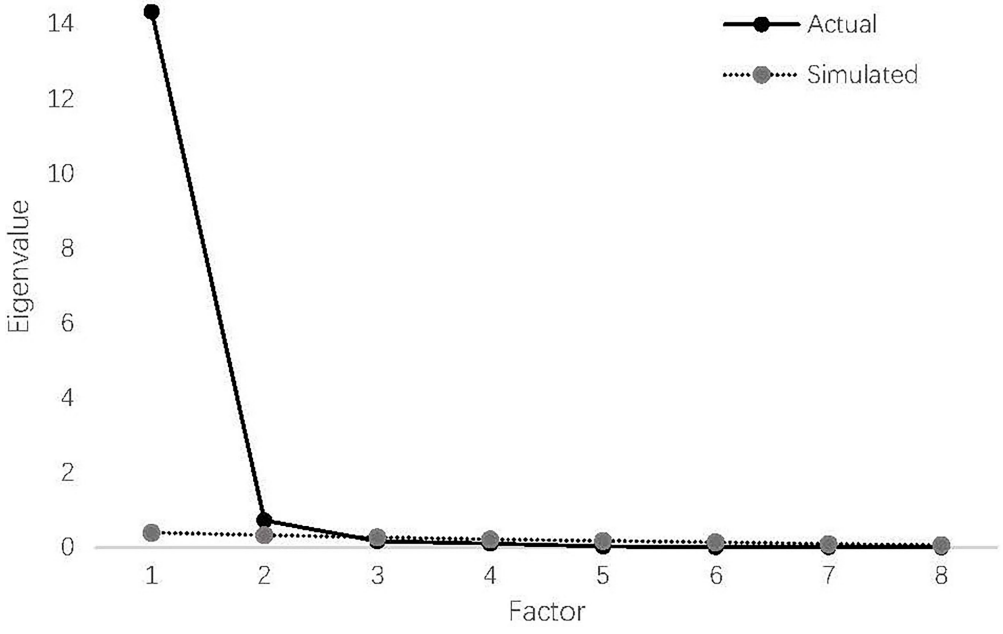

FIGURE 2
Parallel analysis result.

Minnesota satisfaction questionnaire

The CFA result for the one-factor model showed poor model fit the data: $\chi^2(54) = 201.265$, $p < 0.001$, CFI = 0.913, TLI = 0.893, SRMR = 0.045, and RMSEA = 0.078, 90% CI [0.670, 0.090]. Based on residuals and modification indices, we deleted two items, and the revised factor model yielded improved model fits: $\chi^2(35) = 108.36$, $p < 0.001$, CFI = 0.940, TLI = 0.924, SRMR = 0.041, and RMSEA = 0.068, 90% CI [0.054, 0.083]. The Cronbach's α was 0.88.

Mediation model

To test *H1* to *H5* (Figure 1), a mediation model using structural equation modeling (SEM) was incorporated. The indirect effect was estimated with bootstrapping and resampling 1,000 times (Perera, 2013). Table 1 summarizes the results.

As expected, we found negative associations of job stress with both job satisfaction and CTSE (*H1*, *H2*) and positive associations of CTSE with job satisfaction (*H3*). As proposed in *H1*, university teachers' job stress was negatively related to job satisfaction with a total effect (without CTSE): $\beta = -0.51$, $SE = 0.08$, 95%CI [$-0.6, -0.34$], and with direct effect: $\beta = -0.49$, $SE = 0.08$, $p = 0.004$, 95%CI [$-0.6, -0.32$]. We accepted *H2* that job stress was negatively related to CTSE: $\beta = -0.19$, $SE = 0.06$, $p = 0.003$. As proposed in *H3*, CTSE was positively related to job satisfaction; beta, $\beta = 0.14$, $SE = 0.05$, $p = 0.004$.

The path coefficient for indirect effect was significant, $\beta = -0.02$, $SE = 0.01$, 95%CI [$-0.05, -0.01$], and the confidence interval does not include zero. Therefore, the effect of job stress on job satisfaction was significantly mediated by CTSE (*H4*). This finding implies that CTSE may significantly reduce the negative relationship between job stress and job satisfaction. For example, even if university teachers' job stress is high, teachers with a higher level of CTSE may still feel satisfied with their job. In summary, we found that job stress was negatively related to job stress and CTSE; CTSE was positively related to job satisfaction and effectively undermined the negative effect of job stress on job satisfaction.

TABLE 1 Effects of job stress on job satisfaction by college teaching self-efficacy.

Path	β	*SE*	95% *CI*
Job stress → CTSE	−0.19	0.06	[−0.27,−0.02]
CTSE → Job satisfaction	0.14	0.05	[0.07, 0.27]
Job stress → Job satisfaction (direct)	−0.49	0.08	[−0.64,−0.32]
Job stress on job satisfaction (indirect)	−0.02	0.01	[−0.05,−0.01]
Job stress →Job satisfaction (total)	−0.51	0.08	[−0.65,−0.34]

Differential effects of the contextual variables on the mediation model

We further examined whether the mediation effect of CTSE differs depending on gender, teaching load, rank, and teaching experiences. Before examining the moderating effects on the mediation model, these covariates were specified to regress the mediator without interaction terms. With all four covariates, the model showed a marginally acceptable fit to the data, $\chi^2 = 1412.50$, $p < 0.001$, RMSEA = 0.048, 90% CI = [0.044, 0.051], CFI = 0.90, TLI = 0.89, SRMR = 0.053. Among the four covariates, only teaching experience was significantly associated with CTSE in the mediation model, $\beta = 0.15$, $SE = 0.08$, $p = 0.04$. Based on this result, we added teaching experience as a moderator in the mediation model (Figure 1) and analyzed a moderated mediation using the XWITH statement in Mplus syntax. The result showed that the interaction effect between stress and teaching experience on teaching self-efficacy was not significant, $\beta = -0.01$, $SE = 0.06$, $p = 0.90$. However, teaching experience was only significantly associated with teaching self-efficacy, $\beta = -0.15$, $SE = 0.05$, $p = 0.002$. This implies that university teachers' teaching self-efficacy may mediate the negative effect of job stress on job satisfaction, and teaching self-efficacy gets higher when university teachers are more involved in teaching. However, the negative relationship between job stress and teaching self-efficacy does not differ by years of teaching. Figure 3 presents the final model for the mediation results.

Discussion

The present study aimed to extend understanding of the relationship among job stress, job satisfaction, and teaching self-efficacy among university teachers, specifically with a sample of non-Western countries. Although it is well documented that efficacious teachers tend to be more satisfied with their work and could alleviate the negative effect of job stress on job satisfaction (Klassen and Chiu, 2010), the relationship has been relatively unknown in non-Western countries (Gilbert et al., 2014). Further, the interplay with contextual variables (e.g., gender, teaching experience, rank) has not been sufficiently investigated. To address this gap, the present study, predicated on the SCCT (Lent and Brown, 2006), examined direct and indirect relations among job stress, teaching self-efficacy, and job satisfaction and further examined the moderation effects of contextual variables. Our study showed that both job stress and CTSE negatively influenced job satisfaction, and CTSE positively influenced job satisfaction. In addition, CTSE mediated the relationship between job stress and job satisfaction, and teaching experience was positively linked with CTSE in the mediation effect of CTSE.

The finding in terms of the direct relationship between job stress and job satisfaction supports the prior literature. This result suggested that Chinese university teachers with a high level of job stress would feel unsatisfied with their job, which may lead to their motivation to leave their profession. Chinese university teachers'

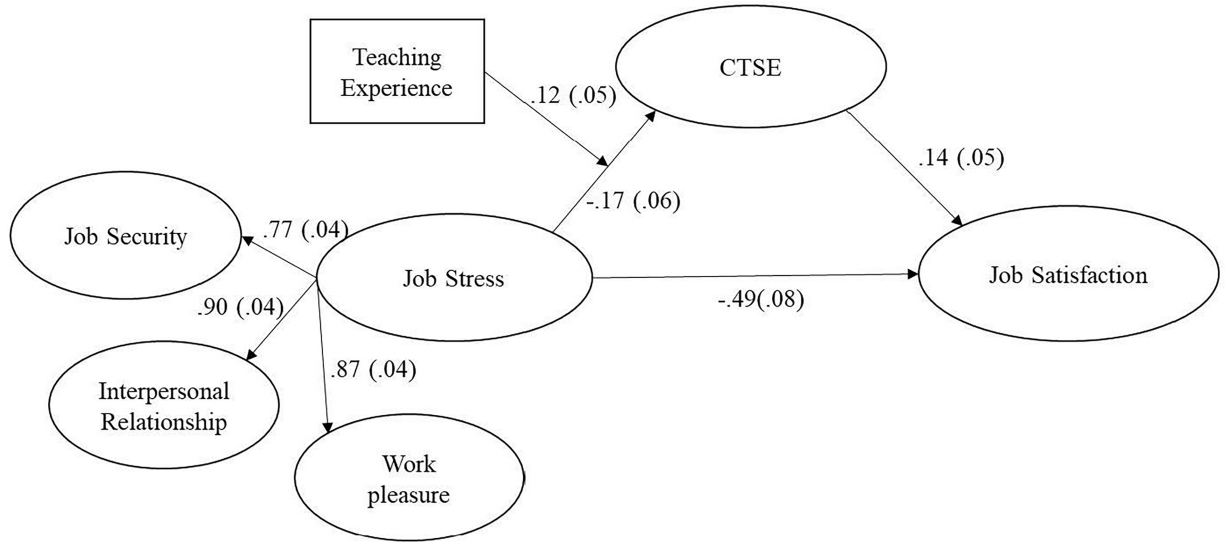

FIGURE 3
Final mediation model with teaching experience. Standardized coefficients are presented on the paths. All measurement indicators, error terms, variances, and covariances are omitted in this figure.

job stress led to lower levels of job satisfaction (He and Liu, 2012; Gao et al., 2015; He, 2015; Wang et al., 2020), which is also consistent with the majority of research findings with samples of K-12 education in western countries (Skaalvik and Skaalvik, 2011; Klassen et al., 2013; Struyven and Vanthournout, 2014). Job stress is an important factor for university teachers, influencing the cognitive and affective perception of the work environment and, thus job satisfaction. Although this finding has been replicated in much research, there are some exceptions. For example, a study with a sample of university teachers in Pakistan found that overall occupational stress was not associated with job satisfaction (Chaudhry, 2012). The contradiction may imply that university teachers in different countries and working environments have different perceptions of job stress and satisfaction. Future studies must dig into the relationship deeply in the higher education context.

We also found a negative relationship between job stress and CTSE. The result suggested that university teachers would feel less confident when experiencing high job stress in the long run. University teachers may perceive their job as more demanding and stressful, and those with higher stress levels perceive themselves as less able to accomplish their teaching tasks in college classrooms. The possible sources of university teachers' job stress are varied, including high demand for their performance, negative feedback from students, excessive workload, and poor working culture. Whatever the reasons are, job stress could be a significant hindrance to teaching work. The stress they endure under challenging situations may result in less confidence in their ability to finish a teaching task. This finding is congruent with studies conducted in Egyptian (El-Sayed et al., 2014), Canada (Klassen and Chiu, 2010), the Dominican Republic (Gilbert et al., 2014), and Iran (Fathi and Derakhshan, 2019), but partially aligns with other research conducted in China (Yin et al., 2020; Han et al., 2021) and other countries (Klassen et al., 2013). More specifically, the relationship between job stress and CTSE can differ in some attributes or sources of stress. For example, stress originating from organizational practices, instructional changes, organizational inadequacy, and new challenges exhibited a negative relationship with teaching self-efficacy, while stressors associated with instructional activities, research support, student quality, and financial inadequacy are positively related to teaching self-efficacy (Yin et al., 2020; Han et al., 2021).

Moreover, a negative and weak relationship existed between workload stress and self-efficacy among teachers in Canada and Thailand. Still, a positive and weak relationship existed in England and Hongkong contexts (Klassen et al., 2013). Given the disparity in research, it would need further research investigating the differential effects of diverse cultures and work environments and different measures of stress on the relationship between job stress and CTSE.

Additionally, the positive correlation between CTSE and job satisfaction aligns with prior research (e.g., Klassen and Chiu, 2010; Gilbert et al., 2014; Alibakhshi et al., 2020; Zakariya, 2020; Toropova et al., 2021; Richter et al., 2022), and added an empirical study replicating the SCCT satisfaction model with a Chinese university teacher sample (Lent and Brown, 2006). In light of this, it can be claimed that Chinese university teachers with high teaching self-efficacy constantly contemplate their teaching tasks and find ways to accomplish them. This makes them more confident in their work and enjoy and feel satisfied with their job. This finding is consistent with research that also found positive relationships between teacher job satisfaction and engagement (Chan et al., 2020; Al'Abri et al., 2022). This raises the possibility of creating some programs to increase college teaching self-efficacy. Consequently, university teachers may perceive their job

satisfaction by reducing the likelihood of suffering job stress (Han et al., 2021). From a theoretical standpoint, teachers who feel highly efficacious in their abilities to accomplish teaching-related tasks may promote student learning and favorable work conditions that foster the experience of job satisfaction (Lent and Brown, 2006). Thus, teachers' beliefs that they can accomplish specific teaching-related tasks may inform more favorable assessments of their satisfaction with their professional roles.

Our mediation analysis also found that CTSE was an effective mediator in the negative relationship between job stress and job satisfaction. This finding supports the prior research that teaching self-efficacy alleviated the negative effect of stress on job satisfaction (Klassen and Chiu, 2010; Han et al., 2021). Teaching self-efficacy may change the perceptions of how job stress influences the feeling of satisfaction in their job and influence teachers' perception of job stress and anxiety. When exposed to stressful working conditions, teachers who have higher levels of self-efficacy may develop a positive attitude toward stress as they feel confident in coping with the challenges in their work (Bandura, 1997). Self-efficacy is a powerful influence on behavior (Bandura, 1997) and plays a critical role in influencing the effort teachers may put into teaching tasks and the persistence in pursuing teaching goals in the face of failure. University teachers with high teaching self-efficacy, suffering from high demand from higher educational context, manage to achieve professional goals, including engaging in challenging teaching work, publishing high-quality papers, and applying for the research fund. These successful experiences could be the sources of teacher self-efficacy and help them sustain satisfaction with their job even in the face of stress.

Although our moderated mediation effects were not significant with several contextual variables (gender, teaching experiences, rank), teaching experience was found to be significantly linked with teaching self-efficacy in the mediation model of CTSE. Our finding suggests that the mediation effect of CTSE may not differ by teaching experience (i.e., the non-significant result of moderated mediation); instead, the mediation effect would constantly work regardless of university teachers' teaching experience. However, the significant covariate effect of teaching experience implies that teachers with more teaching experiences may have greater teaching self-efficacy, which may positively change the perceptions of job stress and job satisfaction. It may simply support a well-known proposition that teaching experience is a vital source for teachers' cognitive evaluations of self-efficacy beliefs. This result also reinforces previous findings that teachers with more experience had high self-efficacy (Gurvitch and Metzler, 2009; Dimopoulou, 2014; Liu, 2014). It also consolidates Bandura (1997) suggestion that mastery experiences are critical to developing self-efficacy. Teachers learn much from their experiences because they try to continuously improve their teaching method and consciously seek useful resources, such as engagement in teacher training and teaching contest. During the process, their teaching self-efficacy is enhanced because they may be inspired by colleagues' encouragement, leaders' positive feedback, and positive role modeling. In addition, teachers with more teaching experience might have faced many challenging tasks and finally found good ways to respond to stressful contexts. Therefore, they may learn from their previous teaching practices and believe they can accomplish any teaching ta. When perceiving higher levels of teaching self-efficacy, teachers may be able to control their stress levels and deal with stressful teaching tasks.

However, prior research has not constantly observed such a positive relationship. The relationship between self-efficacy and teaching experience was not significant among K-8 teachers in Virginia, Kansas, and Arkansas (e.g., Tschannen-Moran and Johnson, 2011) and nonlinear among K-12 Canadian teachers (Klassen and Chiu, 2010). Some Australian secondary teachers with more teaching experiences had greater self-efficacy, while others had lower self-efficacy (Perera et al., 2019). These disparities imply that our sample of Chinese university teachers would have more invariant meanings of teaching experience related to CTSE, and years of teaching, which can be a future research topic.

The present study may contribute to the knowledge base regarding university teachers' job satisfaction as we address the prevalent issues in the university context. In this era of dramatic societal changes and competition surrounding university teachers, teaching self-efficacy is the key to determining teacher well-being and job satisfaction (Zakariya, 2020; Bjorklund et al., 2021; Kong, 2021; Saks et al., 2021; Toropova et al., 2021), engagement (Al'Abri et al., 2022), and retaining with high quality and effectiveness (You, 2014; Madigan and Kim, 2021). The study findings provide evidence-based information regarding the current trends and underlying psychological reasons for university teachers' dissatisfaction, burnout, and turnover, which might be useful for educators, university administrators, and policymakers framing policy and institutional decisions. Further research-based programs and policies should be developed and distributed to promote university teachers' teaching self-efficacy.

Limitations

There are some limitations to the present study. First, the findings cannot be generalized to a broader population because of the potential sample selection bias of the convenience sampling method. Convenience sampling might limit the participants who were interested in the study; thus, we might have oversampled the participants with favorable properties (e.g., low job stress and high self-efficacy). Indeed, our sample's baseline job stress level was low ($M = 2.36$ out of 5, $SD = 0.63$), while the average CTSE was high ($M = 79.03$ out of 100, $SD = 0.11.07$). The average job satisfaction was a moderate level ($M = 2.79$ out of 5, $SD = 0.48$). Therefore, it is possible that teachers with a high level of self-efficacy and a moderate level of satisfaction participated in the study. More replication studies with various samples should be conducted based on advanced sampling techniques (e.g., probability sampling)." Secondly, the sample was primarily drawn from universities in a province and may not be nationally representative in China. Data collection from various higher institutions may provide a broad picture and a different finding for the study. Third, causal explanations should be avoided due to the cross-sectional

survey design. Future research should investigate the effect of job stress on job satisfaction utilizing longitudinal data with multiple waves because such longitudinal research design would allow the mediation tests to be relatively less biased (Maxwell and Cole, 2007). In addition, reducing the number of the original scales (CWSS, MSQ) might deteriorate the content and construct validity of the scale. More thorough investigations of the validity of such shortened scales should be performed to ensure the implications of the study findings. Finally, more in-depth qualitative studies (e.g., interviews) could assist in explaining the quantitative findings.

Implications

Notwithstanding these limitations, the results of this study have practical implications for university and college teachers, teacher programmers, school leaders, and policy and decision-makers in higher education. College teaching self-efficacy could be a valuable resource for teachers, and it may influence teachers to adopt good stress-coping skills and develop a positive attitude toward their job. The results can benefit the pre-service and in-service university and college teachers because they would try to find good ways to enhance their well-being by knowing the linkage among job stress, teaching self-efficacy, and job satisfaction. University teachers in China can dedicate much effort to enhancing their teaching competence by proactively being involved in more teaching practices and developing self-regulatory skills to cope with the stressors of the high demands of universities and colleges.

The findings are helpful for teacher programmers to take teacher psychological variables into account and design and offer appropriate programs and practices that engage teachers in teaching activities and strategies that help raise their self-efficacy beliefs. By engaging in more teaching practices and training, teachers will improve their pedagogical competence and thus improve their self-efficacy beliefs because mastery experience is the key source of self-efficacy (Bandura, 1997). In addition, education programmers should also provide teachers with opportunities to observe the teaching practices of award-winners because teachers may continually communicate with competent teachers to enrich their teaching experience and thus enhance their self-efficacy beliefs by observing other teachers' ability to accomplish a teaching task.

Equally, school leaders can benefit from this study by building a supportive and cooperative environment for university teachers. School leaders could help teachers deal with excessive demands and promote a healthier university which helps lessen work-related stressors and welcome job satisfaction, creating a sustainable working environment in which teachers improve teaching, have more chances to get promotions, and develop their teaching self-efficacy. In a cooperative environment, teachers should seek feedback from the principal or their colleagues, which is helpful for the job satisfaction and psychological safety of newly qualified-teachers (Vanmol et al., 2022). School leaders should also provide more resources and opportunities for university teachers (especially assistant instructors) to engage in teaching programs, teaching seminars, teaching contests, and challenging work. These practices add to novice teachers' teaching experiences and help raise teaching self-efficacy when it is impossible for them to increase their teaching years.

Finally, policy and decision-makers in higher education can take advantage of the findings by reframing and changing some personnel policies to decrease teachers' job stress and increase job satisfaction. Policymakers could reframe and lower the criteria of teaching evaluation and job promotion for university teachers by reducing the high demand for the number of publications and research funds.

Conclusion

Several scholars have investigated the relationship between job stress, teaching self-efficacy, and job satisfaction among K-12 school teachers (e.g., Klassen and Chiu, 2010; Gilbert et al., 2014; Han et al., 2021). However, very few (e.g., Han et al., 2021) investigated their relationship in higher educational contexts. This study filled the gap and found that teaching self-efficacy undermines the negative effect of faculty job stress on job satisfaction. Our mediation model provides more information for understanding the mechanisms underlying the job stress-satisfaction relationship, with participants with firmer self-efficacy beliefs less likely to connect job stress to a lower level of job satisfaction. The present study contributes to the literature by replicating previous research on links between faculty job stress, teaching self-efficacy, and job satisfaction. Implications are provided to help administrators in higher educational institutions reduce faculty job stress *via* improving teaching self-efficacy in teachers' navigation of their job satisfaction.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Texas Tech university. The patients/participants provided their written informed consent to participate in this study.

Author contributions

YL wrote the original draft, did reviewing and editing work, collected data, and analyzed data. SY reviewed and edited the original draft, analyzed data, and decided methodology. KS reviewed the draft and edited it, guided the project, and suggested the process of collecting and analyzing data. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/feduc.2022.1073454/full#supplementary-material

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