Teachers and Teaching
theory and practice

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/ctat20

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To cite this article: Xin Zhang, Wilfried Admiraal & Nadira Saab (2022) Teacher autonomous motivation for continuous professional development: the relationship with perceived workplace conditions, Teachers and Teaching, 28:8, 909-924, DOI: 10.1080/13540602.2022.2137128

To link to this article: https://doi.org/10.1080/13540602.2022.2137128

Published online: 28 Oct 2022.

TEACHERS AND TEACHING
2022, VOL. 28, NO. 8, 909–924
https://doi.org/10.1080/13540602.2022.2137128

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RESEARCH ARTICLE

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Teacher autonomous motivation for continuous professional development: the relationship with perceived workplace conditions

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ABSTRACT

The school context has the potential to hinder or stimulate teachers' motivation to attend Continuous Professional Development (CPD) programs. The present study investigated the relationship between workplace conditions in schools and teachers'autonomous motivation to participate in CPD. A questionnaire was completed by 472 teachers in 13 schools in China. The results show that four school condition variables are related to teachers'autonomous motivation for CPD. The more support teachers report to receive from their school principals and the more work pressure they experience, the more they are motivated for CPD. In contrast, the more teachers report to be supported by their colleagues and the more emotional pressure they receive, the less they are motivated for CPD. In addition, support from colleagues and levels of perceived task autonomy moderate the relationship between teachers'personal factors and their motivation for CPD. Implications are presented for school leaders and policymakers.

ARTICLE HISTORY
Received 19 December 2020
Accepted 19 August 2022

KEYWORDS
Teacher motivation; professional learning; teacher education; teachers' learning

1. Introduction

In order to improve their quality of instruction, school teachers today are required to continuously adapt their knowledge and skills to deal with expanding knowledge, new responsibilities, and growing social expectations (OECD, 2005). However, teachers' continuous learning is not self-evident. Autonomous motivation to participate in Continuous Professional Development (CPD) is a basic condition for teacher learning and successful professional development (Shulman & Shulman, 2009). Previous studies have demonstrated that teachers' characteristics, such as teaching experience, self-efficacy, and beliefs about learning are crucial for their motivation to participate in CPD (e.g.,Gan et al., 2018; Kwakman, 2003; Liu et al., 2018). In addition, some multilevel studies also indicated that workplace conditions in schools, such as teachers' interactions with colleagues, and the role of principals potentially affect teachers' motivation for learning (Hofmann et al., 2003; Loukas & Robinson, 2004; Suchodoletz et al., 2018; Thoonen et al., 2011). It means that the

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relationship between teachers' characteristics and their motivation for learning may vary across different schools, related to the workplace conditions. Yet, to our knowledge, there is no empirical research addressing these direct and indirect effects on teachers' motivation for learning. This study intends to fill this gap by building a multilevel model to investigate the relationship between workplace conditions in school and teachers' motivation for learning, and the possible cross-level moderating effects of workplace conditions on the relationship between teachers' characteristics and their motivation for learning. Answering this question will contribute to a better understanding of how to motivate teachers to participate in CPD.

2. Teacher motivation to participate in CPD

Motivation to participate in CPD has been approached as a multidimensional construct, implying that individuals may have multiple reasons for engaging in a certain behaviour (Deci & Ryan, 2002). In the case of participating in learning activities, a teacher, for example, may work with teaching experts to improve his or her teaching quality motivated by the pleasure and enjoyment derived from this partnership. This represents an example of *intrinsic motivation*, which is considered the most self-determined type of motivation. Besides intrinsic motivation, a teacher may also participate in professional learning activities with the aim to pursue a meaningful outcome from these activities. This is called *identified regulation*. According to the self-determination theory (Deci & Ryan, 2002), intrinsic motivation and identified regulation can be understood as *autonomous motivation*. In contrast, teachers may also participate in professional learning activities when they merely want to avoid feelings of guilt or shame. This is called *introjected regulation*, because the reason for getting in professional learning is not fully internalised. Finally, teachers' participation can be based on the motivation to earn rewards, which refers to the reasons for participating in professional learning that are entirely external from the self. This is called *external regulation*. External regulation and introjected regulation are conceptualised as *controlled motivation*.

Research on teachers' motivation to participate in CPD has systematically revealed that autonomous motivation is positively related to teacher learning outcomes, whereas controlled motivation has been negatively associated with outcomes or shows zero effects (Blais et al., 1993; Deci et al., 2001; Gagné et al., 2010).

3. Workplace conditions and teachers' motivation to participate in CPD

Teacher characteristics such as teachers' teaching experience (Hildebrandt & Eom, 2011), self-efficacy in teaching (Kwakman, 2003), and their conceptions of teaching and learning (Bolhuis & Voeten, 2004) can influence teachers' motivation to participate in CPD. Yet this relationship is not a straightforward one; it might be influenced by teachers' workplace conditions. These workplace conditions can influence teachers' motivation to participate in professional development activities either directly or indirectly through moderating the relationship between teacher characteristics and motivation (Fernet et al., 2008; Lam et al., 2010). Below we will first discuss the potential workplace conditions that can influence teachers' motivation for professional development and then go into the literature on this relationship itself.

3.1. Workplace conditions in school

Based on the study of the psychosocial workload of teaching (Veldhoven & Meijman, 1994), Jansen in de Wal et al. (2020) divided teachers' perceptions of workplace conditions into four aspects and provided a definition for each aspect:

- *Task autonomy*, which comprises the extent to which teachers can decide on when and how to execute their work;
- *Colleague support*, which refers to helpful social interactions available from colleagues on the job;
- *Work pressure*, which refers to challenging aspects of the job, such as workload and the pace of work;
- *Emotional pressure*, which concerns the extent to which teachers perceive their jobs to require emotional investment, such as emotional load, mental strain or suspense;

In addition, several studies suggest that as an important workplace condition in school, principal leadership exercises a significant influence on teacher professional development (Dou et al., 2017; Finnigan, 2010). Chinese school principals in particular, who often have managerial and political roles, are expected to play an important role in teachers' development (Xin & Fred, 2014). According to the work of Bass (1985), leadership can be divided into two dimensions: *transactional leadership and transformational leadership*. Transactional leadership is generally sufficient for maintaining the status quo. But transformational leadership focuses on development for the purpose of change. It motivates followers to do more than they originally expected or they thought possible. For teachers' professional motivation, many researchers indicated that the transformational leadership from principals is crucial for teachers' motivation to participate in CPD (e.g., Eyal & Roth, 2011; Geijsel et al., 2009; Yang, 2014).

3.2. The effects of workplace conditions on teachers' motivation for learning

Many studies have indicated that workplace conditions in school can have a significant influence on teachers' motivation for CPD. For example, Thoonen et al. (2011) showed that task autonomy reinforced the extent to which teachers internalised school values as their personal goals and subsequently affected their motivation to engage in CPD. Ishler et al. (1998) demonstrated that teachers' motivation for professional learning was closely related to the support they received from their colleagues. In a study on teachers' workplace, Rosenholtz (1989) indicated that work pressure is generally regarded as a job challenge. They measured teachers' work pressure and reported that the more challenges teachers reported in their workplace conditions, the more prone they were to maintain their present mode of instructions and to avoid mistakes, and the more reluctant they were to participate in CPD. With respect to transformational leadership from principals, Ishler et al. (1998) demonstrated that teachers' motivation for professional learning was closely related to the transformational leadership support they received from the principal. Principal transformational leadership also positively influenced the degree to which teachers become involved in the educational reform.

Besides these direct effects of workplace conditions on teachers' motivation to participate in CPD, studies in the field of human resource development reported that workplace conditions should be considered as important moderators for people's goal pursuits (Kasser & Ryan, 1993). For our study, this would mean that the relationship between teachers' characteristics and their motivation to participate in CPD may differ depending on the perceptions of various working conditions in school. Yet there is no empirical research as far as we know, addressing the moderating effects of workplace conditions on the relationship between teacher characteristics and teachers' motivation to participate in CPD activities. These insights are needed to understand not only what kind of teachers are motivated to develop themselves, but also how and under what conditions this might be done best. The following research question directed our study:

Q1: Which workplace conditions are related to teachers' autonomous motivation to participate in CPD?

Q2: Which workplace conditions moderate the relationship between teachers' characteristics and their autonomous motivation to participate in CPD?

4. Method

4.1. Procedure and participants

In this study, 523 teachers from 13 primary schools in Shanghai (China) were randomly selected. The first author visited each school and sent the questionnaire directly to teachers. They completed the questionnaire individually at their offices, which took about 30 minutes. In total, 51 teachers had not fully completed the questionnaire on the part of teacher personal factors or school workplace conditions. The questionnaires of these teachers were removed, resulting in the sample of 472 teachers who were included in the analysis. For a few missing items, imputation was used to reduce the number of missing values: missing values were replaced with the mean score of other items from the same dimension.

Participation in the study was strictly voluntary and confidential. Upon recruitment, principals authorised the study within their schools, and teachers were asked to sign an informed consent regarding their collaboration in the study. Ethics approval for this study was granted by the authors' research institution. The mean age of teachers is 37.7 years (SD = 8.5). Participants' information is displayed in Table 1.

4.2. Measures

4.2.1. Teacher autonomous motivation

Teachers' motivation to participate in professional training was assessed using the Teacher motivation inventory (Lam et al., 2010). **The teacher motivation inventory** was modelled after the Self-regulation questionnaire (Ryan et al., 1994). The instrument consisted of four subscales (External regulation, Introjected regulation, Identified regulation, Intrinsic motivation) with five items per scale, constituting a total of 20 items. The items were presented randomly. Teachers were asked to indicate their feelings of motivation on a five-point scale (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree). The 20 motivation items were subjected to an exploratory principal component

Table 1. Participant information (N = 472).

	Participants	N
Gender	Female	425
	Male	47
Subject	Chinese	162
	English	113
	Mathematics	102
	Art	23
	Music	20
	Others	52
Teaching experience	0–3 years	55
	4–6 years	70
	7–18 years	148
	19–30 years	169
	31-plus years	29

factor analysis with oblimin rotation to determine the underlying factors. Oblimin rotation is a common method used in factor analysis that allows correlations between the underlying factors (Jackson, 2005). Three components were extracted, based on factor loadings of 0.4 or higher and the absence of cross-loadings, explaining 44%, 15%, and 7.7% of the variance in motivation scores, respectively. The first component included both intrinsic motivation and identified regulation, and therefore labelled as Autonomous motivation. This means that teachers engage in a learning activity for its inherent enjoyment and pleasure, or they pursue a meaningful outcome from the activity. One example item is 'I participated because I am interested in it.' The other two components were introjected regulation and external regulation, which refers to Controlled motivation. Because previous research shows positive relations between autonomous motivation for professional learning and their outcomes (Roth et al., 2007) and negative or zero effects of controlled motivation (Gagné & Deci, 2005), we focus on teachers' autonomous motivation for learning in the current study.

4.2.2. Teacher characteristics

In a study to describe the impact of factors on teachers' motivation to participate in learning activities, McMillan et al. (2016) indicated that three factors at the personal-level could affect teachers' motivation to participate in professional learning activities: teaching experience, self-efficacy in teaching, and beliefs about learning.

4.2.2.1. Teaching experience. Teachers' teaching experience refers to the number of years of teaching in the classroom. In this study, teaching experience was divided into five categories(Huberman, 1989): zero to three years of teaching experience (Career entry stage); four to six years of teaching experience (Stabilisation stage); seven to 18 years of teaching experience (Experimentation-diversification stage); 19 to 30 years of teaching experience (Serenity stage); and 31 or more years of teaching experience (Disengagement stage).

4.2.2.2. Self-efficacy. Teachers' self-efficacy was assessed using the Teachers' sense of efficacy scale (TSES, 12 items) developed by Tschannen-Moran and Hoy (2001), which includes three subscales: 1) Instructional strategies, 2) Classroom management and 3) Student engagement. The 12 items were subjected to an exploratory principal component factor analysis with oblimin rotation to determine the underlying factors. The final factor

analysis consisted of two components of 11 items, based on factor loadings of 0.4 or higher and the absence of cross-loadings. These two factors explained 55.3% and 9.6% of the variance in self-efficacy scores, respectively. The first component was labelled Efficacy in classroom teaching (7 items) and comprised items from the original scale Instructional strategies and Student engagement. The example item is 'How much can you do to motivate students who show low interest in school work?' The second component was labelled Efficacy in classroom management (4 items). An example item is 'How much can you do to control disruptive behaviour in the classroom?' Teachers indicated their perceptions of self-efficacy on a nine-point scale: 1 = nothing, 3 = very little, 5 = some influence, 7 = quite a bit, 9 = a great deal. The Cronbach's alphas of efficacy in classroom teaching and efficacy in classroom management are 0 .88 and 0.88, respectively, showing satisfying reliabilities for both scales.

4.2.2.3. Teacher conceptions of learning. In order to capture teacher beliefs about student learning as well as their own learning, 46 items were derived from the Teacher conception of learning developed by Bolhuis and Voeten (2004), including five subscales and 46 items: External versus internal regulation, Reproductive versus constructive knowledge, Individual versus social learning, Fixed versus dynamic ability and Intolerance of uncertainty versus tolerance of uncertainty. Teachers stated the extent to which they agreed with the learning conception for themselves and for their students. A four-point scale was used with scores 1 and 2 indicating (strong) agreement with the left side of the dimension and scores 3 and 4 with the right side. Reliability analysis of teacher conception of student learning revealed that only Reproductive versus constructive knowledge ($\alpha = 0.64$), Individual versus social learning ($\alpha = 0.59$) and Fixed versus dynamic ability ($\alpha = 0.67$) showed acceptable Cronbach alphas. For teachers' conceptions of their own learning, only Fixed versus dynamic ability ($\alpha = 0.67$) showed satisfactory reliability. These four scales were labelled Conception of student knowledge, Conception of student teamwork, Conception of student ability and Conception of their own ability, and were included in subsequent analyses.

4.2.3. Perceived workplace conditions in school

4.2.3.1. Principal transformational leadership. Transformational leadership refers to vision building through initiating and identifying a vision for the school's future, providing individual support and intellectual stimulation (Silins, 1994). In this study, principal transformational leadership was measured by 6 items from a questionnaire on School leader transformational leadership (Geijsel et al., 2009). The Cronbach's alpha for principal support is 0.91, indicating satisfactory reliability.

4.2.3.2. Workplace conditions. For this study, we used a questionnaire from Jansen in de Wal et al. (2020) to evaluate teachers' perceptions of workplace conditions. Finally, the questionnaire comprises 19 items, answered on a 4-point Likert type scale with 1 = 'almost never' to 4 = 'almost always'. An exploratory principal component factor analysis with oblimin rotation was performed in order to determine the underlying factors. Four scales were distinguished, based on factor loadings of 0.4 or higher and the absence of cross-loadings: 1) Emotional pressure—four items explaining 25.7% of the variance in scores, showing teacher emotional pressure at work; with items such as: 'Do you experience

a major emotional workload?' 2) Task autonomy—four items explaining 15.5% of the variance in scores, demonstrating how teachers perceived their autonomy at work; with items such as: 'Can you decide for yourself how you carry out your work?' 3) Colleague support—four items explaining 10.2% of the variance in scores, indicating teachers' receipt of support from colleagues; with items such as: 'My fellow colleagues are willing to listen to my work-related problems?'4) Work pressure—five items explaining 7.1% of the variance in scores, showing teachers' perceived pressure from their work, with items such as: 'Do you have to work very fast?' The Cronbach's alphas for emotional pressure, task autonomy, social support from colleagues, and work pressure are 0.81, 0.62, 0.68, and 0.73, respectively, indicating moderate to high reliability. The labels of these four factors were similar to the original questionnaire used by Jansen in de Wal et al. (2020).

The scores on these five workplace conditions in school were aggregated at the school level as the workplace conditions in a school can be understood as the shared perceptions among teachers in the same school. The homogeneity of factors from workplace conditions was assessed by the within-group interrater reliability statistic (r_{wg}). The within-group interrater reliability statistic is a common index to measure the interrater agreement and can be used to determine the appropriateness of aggregating data to higher levels of analysis (Kerrins & Cushing, 2000). A low r_{wg} estimate means samples within the group do not agree, or perceive the construct similarly, and these variables must exceed a threshold of homogeneity to index consensus and justify aggregation to the relevant unit of analysis. A 0.70 criterion has been commonly used (e.g.,George, 1990). In this study, resulting in $r_{wg(j)} = 0.924$ for colleague support, $r_{wg(j)} = 0.954$ for work pressure, $r_{wg(j)} = 0.906$ for task autonomy, $r_{wg(j)} = 0.812$ for principal transformational leadership, and $r_{wg(j)} = 0.858$ for emotional pressure, showing acceptable levels of within-group agreement.

4.3. Analysis

Data on teacher background, self-efficacy, and conceptions of learning, were at teacher level (Level 1), and the aggregated data on Work pressure, Emotional pressure, Task autonomy, Colleague support, and Principal transformational leadership, were at the school level (Level 2). Multilevel regression analyses were performed with factors at level 1 and 2 as predictors of teachers' autonomous motivation. A step-by-step approach was applied using Mplus 8,

a statistical modelling programme that provides researchers with a flexible tool to analyse multilevel data (Muthen & Muthen, 1998). In this study, Mplus 8 can estimate two-level models to explore the moderating effects of workplace conditions on the relationship between teachers' personal factors and their autonomous motivation for participation in professional learning.

First, a variance components (model 0) model was built to examine the variance in teachers' autonomous motivation at both level 1 (Teacher) and level 2 (workplace conditions). In the second and third step, the factors from teacher level (model 1) and the workplace conditions level (model 2) were added to model 0 respectively. In the fourth step (final model 3),

all the direct effects and cross-level interactions were added to the equation. All predictors were grand-mean centred.

5. Results

The results from the unconditional model (model 0) indicate that the variance of the within-group component equals $\sigma^2 = 0.382$, and the variance of the between-group components equals $\tau = 0.024$ (see, Table 3). The interclass correlation value (ICC) = 0.059, suggesting that 5.9% of the variance in autonomous motivation is at the school level. The descriptive statistics for the dependent and independent variables are shown in Table 2. The correlations of the moderators and other variables are shown in the Appendix.

5.1. Direct effects of workplace conditions in school

With respect to the workplace conditions, a significant relationship between four predictors and autonomous motivation for learning has been found (see, Table 3). First, support from colleagues (B = −0.470, p = 0.021) and emotional pressure (B = −0.597, p = 0.001) are negatively related to teachers' autonomous motivation, implying the more support teachers perceived from their colleagues, and the more emotional pressure teachers reported, the less autonomously motivated they are for professional learning activities. Secondly, work pressure (B = 0.766, p = 0.001) and support from principals (B = 0.379, p < 0.001) are positively related to autonomous motivation, implying the more work pressure and support from principals teachers reported, the more autonomously motivated they are for professional learning. The results also indicate an insignificant within-group relationship between task autonomy and autonomous motivation (B = 0.201, p = 0.214).

5.2. Indirect effects of workplace conditions in school

Since the moderator effects were included in model 3, some teacher characteristics, which are important for teachers' motivation in model 1, not related to teachers' motivation in model 3. The result of these moderator analyses shows two significant cross-level interaction effects. First, the relationship between teaching experience and autonomous

Table 2. Descriptive statistics for the dependent and independent variables.

	Number of items	Mean	SD	α	N
Teacher motivation					
Autonomous motivation	10	3.88	0.63	0.94	472
Teacher characteristics					
Efficacy in teaching	7	6.35	1.08	0.88	472
Efficacy in classroom management	4	6.91	1.29	0.88	472
Conception of student knowledge	4	3.48	0.54	0.64	472
Conception of student teamwork learning	4	3.26	0.54	0.59	472
Conception of student ability	5	3.07	0.55	0.67	472
Conception of their own ability	4	3.32	0.55	0.67	472
Workplace conditions					
Principal transformational leadership	6	3.07	0.65	0.91	472
Emotional pressure	4	2.26	0.64	0.81	472
Work pressure	3	3.24	0.62	0.73	472
Colleague support	4	2.80	0.52	0.68	472
Task autonomy	4	2.21	0.58	0.62	472

Note. *SD = standard deviation.*

Table 3. The result of multilevel analyses for teacher autonomous motivation.

	Model 0	Model 1	Model 2	Model 3
Fixed effects	*B (SE)*	*B (SE)*	*B (SE)*	*B (SE)*
Intercept	3.879**(0.051)	1.664** (0.271)	3.908** (0.029)	3.887** (0.024)
Level 1 main effects				
Teaching experience		−0.047* (0.020)		
Efficacy in teaching		0.147**(0.039)		0.299** (0.027)
Efficacy in management		−0.033* (0.026)		
Conception of student knowledge		−0.014 (0.030)		
Conception of student teamwork		0.127* (0.042)		
Conception of student ability		0.236* (0.055)		
Conception of teacher ability		0.173*(0.051)		
Level 2 main effects				
Principal transformational leadership			0.379**(0.105)	0.367** (0.101)
Task autonomy			0.201 (0.162)	
Work pressure			0.766** (0.235)	0.789* (0.272)
Emotional pressure			−0.597** (0.180)	−0.620** (0.167)
Colleague support			−0.470* (0.203)	−0.470* (0.162)
Cross-level interactions				
Colleague support× Teaching experience				−0.472* (0.149)
Task autonomy × Efficacy in teaching				−0.447* (0.204)
Random				
Level 1 (within)	0.382** (0.031)	0.293**(0.022)	0.379** (0.030)	0.321** (0.026)
Level2 (between)	0.024 (0.017)	0.012**(0.008)	0.001 (0.004)	0.002 (0.012)
Model statistics				
R^2		0.494	0.621	0.685

Note*: Only significant direct effects and cross-level interactions are shown in the Model 3. SE = standard error. * = P < .05, ** = P < .001*

motivation for learning is moderated by colleague support (B = —0.472, p = 0.002), which means that the relationship between teaching experience and autonomous motivation ***is*** more negative in schools where the support from colleagues is perceived as higher. We illustrate this effect in Figure 1. For experienced teachers, there is a negative relationship between support from colleagues in school and teachers' motivation. For beginning teachers, the support from colleagues in school generally does not make a difference for their motivation for professional learning.

Second, we find a cross-level interaction between task autonomy and self-efficacy in classroom teaching on autonomous motivation for learning (B = −0.447, p = 0.028), which means that the relationship between teacher self-efficacy in classroom teaching and autonomous motivation is different for schools with low and high scores for task autonomy. We illustrate this cross-level interaction in Figure 2. Low-efficacious teachers are more motivated in schools with a high level of task autonomy, compared to low levels of task autonomy. For high-efficacious teachers, task autonomy at the school level is generally not related to their autonomous motivation for learning.

6. Discussion and conclusion

The results indicate that four school condition variables (principal transformational leadership, work pressure, emotional pressure, and colleague support) are related to teachers' autonomous motivation for CPD. In addition, two school condition variables (colleague support and task autonomy) moderate the relationship between teachers' personal factors and their motivation for CPD. In this section, we will discuss our main findings.

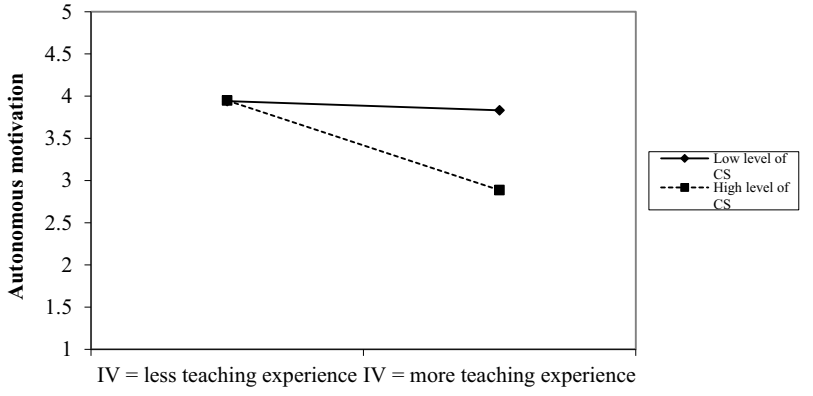

Figure 1. Moderating effect of colleague support on the relationship between teachers' teaching experience and their autonomous motivation to participate in professional learning.
Note*: CS = Colleague support, IV = Independent variable*

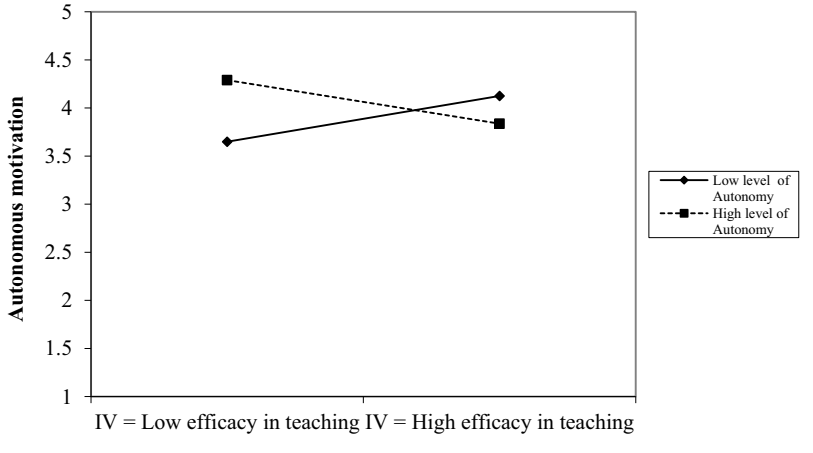

Figure 2. Moderating effect of task autonomy on the relationship between teachers' teaching experience and their autonomous motivation for participation in professional learning.
Note*: IV = Independent variable*

6.1. Workplace conditions related to teachers' autonomous motivation to participate in CPD

Firstly, the principal transformational leadership appeared to be related to teachers' autonomous motivation. Previous studies have indicated that Chinese principals have a large influence on teachers' teaching (Xin & Fred, 2014; Yang, 2014). Our findings extend this finding, by showing that Chinese principals not only influence teachers' teaching but also their motivation to participate in professional learning activities. Our results indicate that through initiating and identifying a vision for the school's future, providing individual support and intellectual stimulation, principals could stimulate Chinese teachers' autonomous motivation to participate in professional learning activities.

In addition, our results indicate that different types of pressure have different effects on teachers' motivation for learning. Work pressure is positively and emotional pressure is

negatively related to teachers' autonomous motivation for learning. Crawford et al. (2010) identified work pressure as a job challenge. For teachers, meeting these challenges may be perceived as an opportunity to learn and to exercise and show capacities. According to the perspective of self-determination theory (Deci & Ryan, 2002), meeting the demands of the challenges can satisfy the need for competence and lead to motivation for learning. Compared to work pressure, emotional pressure is more likely to cause teachers' emotional exhaustion, which may decrease teachers' autonomous motivation to learn. There is some evidence that teachers' emotional exhaustion may decrease their motivation for learning as such pressure may distract their attention from professional learning and work affairs (Kwakman, 2003; Pelletier et al., 2002).

Our results also indicate that colleague support is negatively related to teachers' autonomous motivation for learning. This result contradicts the findings of previous research claiming that support from colleagues has a positive influence on teachers' motivation for learning (e.g., Supovitz et al., 2010; Thoonen et al., 2011; Zhang & Wong, 2018). One possible explanation might be that teachers may not be motivated to participate in professional learning activities when they have received support from their colleagues. In that case, teachers think they can ask for support from their colleagues to solve their problems.

6.2. Perceived workplace conditions moderating the relationship between teacher characteristics and teachers' autonomous motivation to participate in CPD

Two moderating effects of perceived workplace conditions have been found. First, our results indicate that experienced teachers' autonomous motivation is negatively influenced by support from colleagues, whereas, for beginning teachers, the support from colleagues in schools does not make a difference for their autonomous motivation for professional learning. The possible explanation for the negative relationship between colleague support and motivation of experienced teachers might be that when experienced teachers think they can learn from their colleagues, they are less motivated to participate in additional professional learning activities. This finding corroborates the findings of other researchers that with an increase in teaching experience, teachers become less likely to participate in professional learning (Hildebrandt & Eom, 2011; Louws et al., 2018; Maskit, 2011). Although the support from colleagues is helpful for their professional development, beginning teachers are still motivated to participate in various professional learning activities to continuously improve their ability.

Second, we also found a significant negative moderating effect of task autonomy on the relationship between teachers' self-efficacy in teaching and their autonomous motivation (see, Figure 2). Our results indicate that compared to high-efficacious teachers, low-efficacious teachers were more motivated when they stay in schools with a high level of task autonomy. It means that for low-efficacious teachers, the high level of task autonomy is crucial to improve their autonomous motivation to participate in learning activities. Although many studies have explored the influence of task autonomy on teachers' motivation for learning, our study suggests that this is different for low-efficacious and high-efficacious teachers. Low-efficacious teachers in schools with relatively low levels of task autonomy might be focused on 'doing what is expected from them' to receive recognition by their principal and to improve their confidence that they can meet the requirements. In contrast, low-efficacious teachers in schools with relatively high levels of task autonomy might feel enough autonomy to attend professional learning activities in order to improve their capabilities. This differential effect of

task autonomy in school is also reported by Mintzes et al. (2013). Based on interviews with teachers they reported that low-efficacious teachers showed greater enthusiasm to participate in learning activities when they could make their own decisions about their work and learning, compared to high-efficacious teachers.

7. Implications for school leaders

Our findings can have implications for school leaders and policymakers to implement strategies that foster teacher motivation to attend CPD programmes.

Firstly, our results indicate that compared to inexperienced teachers, experienced teachers are less motivated to participate in learning activities as they seem to more willing to seek help from their colleagues. Given this, school leaders could provide more challenges to experienced teachers to not only make their work more satisfying and fulfilling, but also to stimulate participation in professional learning activities to acquire new capacities needed to take up these challenges. These new challenges can be related to innovative pedagogies such as inclusive teaching or the use of adaptive technology to support student learning, but also to other roles in school as mentoring newly arrived teachers and providing workshops for their colleagues.

Secondly, our findings indicate that the level of task autonomy in school is crucial for low- efficacious teachers' participation in professional learning activities. School leaders could give low-efficacious teachers more freedom to decide how they design their teaching, and build a culture of an autonomy-supportive working environment within schools.

8. Limitations

One limitation is that our study only used quantitative methodologies to explore the moderating effects of workplace conditions on the relationship between teachers' characteristics and their autonomous motivation for learning. Since teachers' perception of motivation is a complex psychological mechanism and various psychological and organisational circumstances affect teachers' motivation. We advise future studies to use additional qualitative or mix-method approaches (e.g., in-depth face-to-face interviews) to provide a better understanding of teachers' motivation and influential factors.

9. Concluding remarks

This study explored the relationship between perceived workplace conditions in schools and teachers' autonomous motivation. In addition to the direct effects of school conditions on teachers' motivation to participate in professional learning, two workplace conditions in schools, task autonomy, and colleague support, moderated the relationship between teacher characteristics and motivation. These findings can have implications for school leaders and policymakers to implement strategies that foster teacher motivation to attend CPD. In order to provide a better understanding of teachers' motivation for learning, future studies could also use qualitative methodologies to further explore the inner psychological mechanism of teachers' perceptions of motivation.

Disclosure statement

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

Funding

This work was supported by the China Scholarship Council [201606140105] and Research Center for New Schooling Education, East China Normal University [2018010108].

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Appendix Correlations of the moderators and variables

Varibale	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Autonomous motivation	-												
2. Principal transformational leadership	0.196**	-											
3. Task Autonomy	0.072	0.181**	-										
4. Work pressure	−0.005	0.096*	−0.378**	-									
5. Emotional pressure	−0.112*	−0.102*	−0.429**	0.763**	-								
6. Colleague support	−0.079	−0.012	−0.155**	.0719**	0.590**	-							
7. Efficacy in teaching	0.314**	0.079	0.094*	0.027	−0.031	0.081	-						
8. Efficacy in management	0.173**	−0.024	0.046	0.006	−0.016	0.085	0.701*	-					
9. Teaching experience	−0.002	−0.005	0.109*	−0.168**	−0.025	−0.069	0.206**	0.216**	-				
10. Conception of student knowledge	0.202**	−0.010	−0.064	−0.023	−0.063	0.020	0.117*	0.089	0.074	-			
11. Conception of student teamwork	0.330**	0.070	−0.007	−0.016	−0.075	−0.007	0.265**	0.190**	0.100**	0.476**	-		
12. Conception of student ability	0.408**	0.114*	0.066	−0.071	−0.154**	−0.028	0.291**	0.180**	0.089	0.389**	0.505**	-	
13. Conception of teacher ability	0.369**	0.040	0.081	−0.048	−0.135**	−0.036	0.260**	0.185**	0.033	0.447**	0.509**	0.561**	-

Note: *Correlation is significant at the 0.01 level (2-tailed). Correlation is significant at the 0.05 level (2-tailed).*