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**Author(s):** Chan, Sze Wah; Pöysä, Sanni; Lerkkanen, Marja-Kristiina; Pakarinen, Eija

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# Teachers' occupational well-being in relation to teacher–student interactions at the lower secondary school level

Sze Wah Chan , Sanni Pöysä , Marja-Kristiina Lerkkanen  and Eija Pakarinen 

Department of Teacher Education, University of Jyväskylä, Jyväskylä, Finland

## ABSTRACT

This study investigated the relation between teachers' occupational well-being and the quality of teacher–student interactions in lower secondary schools in Finland. Teachers ( $N=48$ ) self-rated their occupational well-being in terms of engagement, stress, job demands, and emotional exhaustion. Teacher–student interactions in classrooms were video-recorded and coded with the Classroom Assessment Scoring System. The results of multivariate regression analyses showed that teachers who reported higher work-related stress were observed with a lower quality of emotional support, classroom organization, and instructional support when controlling for background factors. It is proposed that the observed quality of teacher–student interactions is related to teachers' work-related stress in lower secondary schools.

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## KEYWORDS

Teacher occupational well-being; teacher–student interactions; burnout; work engagement; emotional exhaustion; lower secondary school

## Introduction

Teachers' occupational well-being is a critical topic of concern for the teaching profession and for students' learning. The nature of work in the teaching profession is challenging. Much like other professions, teachers' work is not defined solely by physical demands but also by social and emotional demands (Siegrist et al., 2004). In classrooms, teachers' well-being is often challenged by different demands; for instance, the workload related to interaction demands in the classrooms may affect their ability to facilitate supportive and engaging interactions with students and thereby influence student outcomes (Allen et al., 2013; Grining et al., 2010; Pöysä, 2020; Pöysä et al., 2019). As reviewed by Hascher and Waber (2021), research on the impact of teachers' well-being with its relations to teaching quality and social relations is scarce. A few prior research studies suggested that teachers' well-being may contribute to the quality of teacher–student interactions (Jennings, 2015; Penttinen et al., 2020; Virtanen et al., 2018). Yet, a more comprehensive understanding about different aspects of teacher occupational well-being in relation to the interactions in classrooms, particularly at the secondary school level of education, is limited. Therefore, understanding the role of teachers' well-being in the quality of teacher–student interactions is believed to be an essential move to support students' learning and development. Consequently, this study investigates how teachers' occupational well-being is related to the observed quality of teacher–student interactions in lower secondary school classrooms.

**CONTACT** Sze Wah Chan  sze.wah.chan@juu.fi  Department of Teacher Education, University of Jyväskylä, P.O. Box 35, 40014, Jyväskylä, Finland

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## Quality of teacher–student interactions

Teachers' interactions with students are considered one of the foundational ways to support learning and development in the classroom regardless of age and grade (Allen et al., 2013; Cash et al., 2019; Hamre et al., 2013). For instance, secondary school classrooms with a higher quality of positive emotional climate and which use diverse and engaging instructional learning formats were found to be related to higher levels of student achievement (Allen et al., 2013). In addition, Pöysä et al. (2019) indicated that emotional support in lower secondary school was associated with students' emotional engagement while classroom organization was related to their behavioral and cognitive engagement.

In this study, the quality of teacher–student interactions was examined using the Teaching through Interactions (TTI; Hamre et al., 2013) framework. TTI is one of the most often used and empirically tested theoretical frameworks to conceptualize teacher–student interactions. Theoretically, TTI derives from several developmental theories and empirical studies (Allen et al., 2013; Hafen et al., 2015; Hamre et al., 2013; Pianta et al., 2012). TTI considers the micro-level in the ecological systems theory which represents the patterns of interpersonal relations (Bronfenbrenner & Morris, 1998), and posits that daily interactions between teacher and students are a central driver for student learning and development (Hamre et al., 2013; Pianta et al., 2012). In the TTI framework, teacher–student interactions are conceptualized in three broad domains: emotional support which is based on attachment theory (Bowlby, 1969) and self-determination theory (Deci & Ryan, 1985), classroom organization which focuses on the facilitation of self-regulation (Blair, 2003), and instructional support which highlights the use of high-quality feedback for students' higher-order thinking skills and conceptual understanding (Hamre et al., 2013; Pianta et al., 2012). TTI encourages high-quality and supportive teacher–student interactions across subjects (Bronfenbrenner, 2009; Hamre et al., 2013; Neal & Neal, 2013), across school levels (Hafen et al., 2015; Hamre et al., 2013; Penttinen et al., 2020; Pöysä et al., 2019), and across countries with different educational settings (Hamre et al., 2013; Virtanen et al., 2018; von Suchodoletz et al., 2020). Specifically for secondary classrooms, TTI has been used to investigate the relations between interaction quality and various student outcomes, such as engagement and motivation (Pöysä et al., 2019; Spearman & Watt, 2013; Virtanen et al., 2015), academic achievement (Allen et al., 2013), academic involvement (Sølvik & Glenna, 2022), and mental health (Ertesvåg & Havik, 2021). Moreover, TTI has also been used for reaching a better understanding of lower secondary school teachers' occupational well-being in terms of their job satisfaction (Lerang et al., 2021; Virtanen et al., 2019). However, there is still limited knowledge on the quality of teacher–student interactions, and its relations with teachers' occupational well-being in the secondary school setting (for exceptions see Braun et al., 2018; Pöysä et al., 2019; Virtanen et al., 2018).

## Teachers' occupational well-Being

Occupational well-being is described using various aspects of one's job, such as affective, motivational, behavioral, cognitive, and psychosomatic aspects (van Horn et al., 2004). One of the essential positive aspects of occupational well-being is teachers' work engagement. Work engagement is frequently conceptualized with definitions that may overlap with other work-related constructs (Bakker et al., 2011). Yet, work engagement has often been framed with energy (i.e., vigor), involvement (i.e., dedication), and efficacy (which could be subsumed under a same broad concept with absorption) as the main features (Schaufeli et al., 2002). Further, the cognitive, emotional, physical (Saks, 2008), and the social domains are posited as the main factors of engagement (Klassen et al., 2013). In the current study, teachers' engagement is defined as a motivational state of mind responding to the personal resources allocation to complete the tasks required by a particular occupation (Christian et al., 2011). It refers to intrinsic motivational forces which lead to engaged behaviors (Klassen et al., 2013). In practice, teachers with higher levels of engagement could experience higher feelings

of energy, which, in turn, lead to their actions with higher involvement in teaching. The present study measures work engagement by utilizing a teaching-profession-specific measure, the Engaged Teachers Scale (ETS; Klassen et al., 2013). The ETS measure focuses on areas such as emotional engagement, cognitive engagement, and social engagement with students.

One of the negative aspects of occupational well-being is the experience of stress. In this study, teachers' experience of stress is tapped by three factors: teachers' experience of occupational stress, work-related demands, and prolonged stress, i.e., emotional exhaustion. First, the cognitive appraisal theory from Lazarus and Folkman (1984) and their revised model of stress and coping (Lazarus, 1999) conceptualized stress as the experience during the interaction between an individual (e.g., personal resources) and the environment (e.g., challenges). Such interactions influence an individual's interpretation of the situation, their followed behaviors, and their emotions, and thereby their well-being. In practice, teachers' occupational stress is presented as the negative emotions that teachers experience resulting from some aspects of their work as a teacher (Cumming, 2017; Elo et al., 2003; Kyriacou, 2001). Second, the effort-reward imbalance (ERI) at work model (Siegrist, 1996; Siegrist et al., 2004) captures stress caused by work-related demands. In this model, *effort* describes demands from work, and *reward* describes gain from work. An imbalance of effort and reward, for instance, high effort and low reward, could influence one's physical and mental health, such as higher levels of emotional exhaustion (Siegrist et al., 2004; Wang et al., 2015). This study focused on the effort aspect, i.e., teachers' experience of demands. Based on the concept of ERI, teachers who expose themselves more to high demands at work could exaggerate their efforts beyond what is formally needed and feel overstretched (Siegrist et al., 2004). Finally, prolonged work-related stress could lead to burnout (Maslach et al., 2001). Burnout is commonly defined as a syndrome containing three aspects: emotional exhaustion, decreased professional self-efficacy, and cynicism (Feldt et al., 2014; Maslach et al., 1997). Emotional exhaustion, as a core aspect of burnout, is characterized as the feelings of strain on and the depletion of an individual's emotional resources (Maslach et al., 1997, 2001). Teachers with exhaustion often experience emotional strain and feel overtaxed at work (Salmela-Aro et al., 2011).

### **Occupational well-being in relation to the quality of teacher–student interactions**

The prosocial classroom model of Jennings and Greenberg (2009) reflects teachers' social and emotional competencies and well-being as vital for managing students' behavior and for developing supportive teacher–student relationships. Therefore, understanding how teachers' well-being would interact with other elements in the classroom using the lens of social interaction is essential. Teachers' engagement and experiences of stress in the interactive dynamic of classrooms are framed by the Job Demands-Resources model (Bakker & Demerouti, 2008; Schaufeli & Bakker, 2004) which is rooted in two main processes: a wearing-out process, developing from job demands to burnout, and a motivational process, developing from job resources to the formation of engagement. Together with considering the teacher–student interaction element, this framework highlights the job-related aspects and personal aspects of resources and demands. On the one hand, job-related and personal resources (e.g., well-being) may enhance work engagement and compensate for the negative aspects of work, while on the other hand, stress and burnout could be caused by the demands of the job (e.g., overall work demands, interactions in classrooms) when resources for teachers (e.g., well-being) are insufficient for them to meet the demands (Bakker & Demerouti, 2008; Schaufeli & Bakker, 2004).

As reviewed by Hascher and Waber (2021), previous studies have mainly investigated occupational well-being in relation to teacher-related variables, whereas studies linking well-being to the observed quality of teacher–student interactions in classrooms are rare. Among the TTI framework-related studies, only a few have investigated such connections with all three domains of teacher–student interactions considered (Jennings, 2015; Penttinen et al., 2020; Virtanen et al., 2018), while some studies have focused on the first two domains of teacher–student interactions (Braun

et al., 2018; Friedman-Krauss et al., 2014; Hoglund et al., 2015). Moreover, most of the above studies focused on the negative aspects of the teachers' occupational well-being.

A study by Penttinen et al. (2020) showed that kindergarten teachers' work engagement positively associated with instructional support, while teachers' stress negatively predicted the quality of emotional support and classroom organization. Teacher emotional exhaustion also shows negative associations with emotional support and instructional support at the preschool level (Jennings, 2015). At the middle school level (grade 6–8), Braun et al. (2018) confirmed the negative association between teacher burnout and emotional support and classroom organization, yet a positive relation between stress and emotional support was found. Teacher stress and exhaustion at work were also found to be negatively correlated with classroom organization, while stress showed a negative correlation with instructional support at Grade 6 (Virtanen et al., 2018). However, there are also some contradicting findings. In a study for preschool level, Friedman-Krauss et al. (2014) reported that both low and high levels of teacher stress are associated with a lower quality of emotional climate, and moderate levels of stress are associated with a higher quality of emotional climate. Yet, Hoglund et al. (2015) reported that there was a reciprocal association between teacher burnout and classroom organization, among teachers from kindergarten to the grade 3 level.

The above review shows that knowledge about the relationships between observed teacher–student interactions and teacher occupational well-being, particularly in the secondary school context, is limited. This study aims to fill this gap by investigating the roles of both the positive and negative aspects of teacher occupational well-being in all domains related to the quality of observed teacher–student interactions at the secondary school level.

## The present study

This study investigated teachers' occupational well-being in relation to the quality of teacher–student interactions (i.e., emotional support, classroom organization, and instructional support) in lower secondary school (grade 7 with an average student age of 13). The following research questions (RQ) were specified:

RQ1 To what extent is teacher engagement (emotional engagement, cognitive engagement, and social engagement with students) associated with the quality of teacher–student interactions?

RQ2 To what extent is a teacher's experience of occupational stress (occupational stress, job demands, and emotional exhaustion) associated with the quality of teacher–student interactions?

Based on earlier findings, first, it was expected (Hypothesis 1) that teachers' engagement would have positive association with a higher quality of instructional support (Penttinen et al., 2020). Second, it was expected (Hypothesis 2a) that teachers' occupational stress would have negative association with the quality of emotional support, classroom organization (Penttinen et al., 2020; Virtanen et al., 2018), and instructional support (marginally Virtanen et al., 2018). Further, based on the effort-reward imbalance at work model (Siegrist, 1996; Siegrist et al., 2004), it is hypothesized (Hypothesis 2b) that teachers who experience excessive high level of job demands could experience stress and show lower levels of interaction quality. Furthermore, it was expected (Hypothesis 2c) that prolonged experiences of stress (i.e., emotional exhaustion) would be negatively related to the quality of emotional support (Braun et al., 2018; Jennings, 2015), to classroom organization (Braun et al., 2018; Virtanen et al., 2018), and to instructional support (Jennings, 2015).

## Methods

### *Participants and procedure*

This study is part of a larger longitudinal study (The First Steps Study, Lerkkanen et al., 2006–2017) examining student learning and motivation in different interpersonal contexts in Finland.

Approximately 2,000 students and their teachers from four municipalities participated in the study. Participants of the present study, 48 subject teachers who teach language arts (22 females, 3 males) or mathematics (10 females, 13 males), were selected based on their voluntary participation in classroom observation. All the teacher-participants have master's degrees and qualifications for the subject being taught.

The university's Ethics Committee approved the study in 2006, and the study conforms with the Declaration of Helsinki following the national guidelines of the Finnish National Board on Research Integrity (TENK, 2019). Written consent was obtained from the teachers for their voluntary participation as well as from the parents regarding the classroom observation in their children's classrooms. Teachers filled in a questionnaire about their occupational well-being, and their interactions in the grade 7 classrooms were video recorded in spring 2014 (1–6 lessons per teacher, with each recording lasting for approximately 45 min for a single lesson and 90 min for double lessons).

## Measures

### Quality of teacher–student interaction

The quality of teacher–student interactions was assessed by coding the video-recorded lessons using the Classroom Assessment Scoring System–Secondary (CLASS–S) measure (Pianta et al., 2012). The CLASS–S measure has been validated in Finnish context (Virtanen et al., 2018). In the measure, three domains of teacher–student interaction quality were coded: *emotional support* (three dimensions: positive climate, teacher sensitivity, and regard for student perspectives), *classroom organization* (three dimensions: behavior management, productivity, and negative climate), and *instructional support* (five dimensions: instructional learning formats, content understanding, analysis and inquiry, quality of feedback, and instructional dialogue). All the dimensions were rated on a 7-point scale (1–2 *low*, 3–5 *mid*, and 6–7 *high*). The CLASS–S manual (Pianta et al., 2012) instructed coders with detailed coding examples for the ratings of each item. Each 45-minute lesson was divided into three episodes (approximately 14 min each) and was coded independently. Coding was performed by eight trained coders who were required to reach  $\geq 80\%$  agreement within and between four or more master-coded episodes (Pianta et al., 2012) before the actual coding started. In addition, 20% of the episodes were double-coded by a pair of trained coders, and the inter-rater reliability and Krippendorff's alpha were considered high ( $\alpha_{icc} = .90$  and  $\alpha_{Krippendorff} = .86$ ; Pöysä et al., 2019). The resulting scores were used to generate mean scores for the three domains, which were then used in the data analyses of this study. The Cronbach alphas for emotional support, classroom organization, and instructional support were .74, .81, and .81, respectively.

### Teachers' background characteristics

The Z-scores of teachers' *gender* (0 = female, 1 = male), of the *subject* the teacher taught (0 = language arts, 1 = mathematics), and the teachers' *professional experience* at schools measured in years of teaching (1 = less than one year; 2 = 1–5 years; 3 = 6–10 years; 4 = 11–15 years; 5 = more than 15 years) were used as control variables in further analyses.

## Teachers' occupational well-Being

### Teachers' engagement

Teachers' work-related engagement was measured using the Engaged Teachers Scale (ETS; Klassen et al., 2013) developed with a collected concept of the engagement and interactions of the teaching profession. ETS consists of 16 items mapping into four factors: *emotional engagement* ( $\alpha = .68$ ; e.g., "I find teaching fun"), *cognitive engagement* ( $\alpha = .92$ ; e.g., "I am enthusiastic about my job"), *social*



*engagement with students* ( $\alpha = .83$ ; e.g., “In class, I am aware of my students’ feelings”), and *social engagement with colleagues* ( $\alpha = .75$ ; e.g., “At school, I care about the problems of my colleagues”). Items were rated with a 5-point Likert scale (1 = *does not apply to me at all*; 5 = *applies to me very well*). Before calculating the mean scores of each factor for analyses, the factor structure of the ETS scale was tested with the sample of 120 teachers participating in the larger follow-up study (see Appendix A). In this study, the following three factors were considered theoretically relevant and were selected for further analyses: *emotional engagement*, *cognitive engagement*, and *social engagement with students*.

### **Teachers’ experience of stress**

Three constructs of teachers’ experience of stress were measured: occupational stress, job demands, and emotional exhaustion. *Occupational stress*: A validated single-item scale (Elo et al., 2003) was used to capture the general occupational stress of the teacher. The scale’s item was: “Stress means a situation in which a person feels tense, restless, nervous, or anxious, or is unable to sleep at night because his/her mind is troubled all the time. Do you feel this kind of stress these days?”. A 6-point Likert scale (1 = *not at all*; 6 = *very much*) was used. *Job demands*: The effort-reward imbalance (ERI; Siegrist, 1996; Siegrist et al., 2004) questionnaire/measure was used to capture the stress caused by work-related demands. The five items (e.g., “I have constant time pressure due to a heavy workload”) representing a subscale of effort were measured with a 6-point Likert scale (1 = *completely disagree*; 6 = *completely agree*). Based on the Cronbach alphas, one of the items was removed. With the acceptable Cronbach alpha (.67), a mean score of the four items was used in the analyses. *Emotional exhaustion*: To capture the teachers’ experiences of emotional exhaustion, which reflects the prolonged experience of stress, a shortened Finnish version of the Bergen Burnout Inventory (BBI-9; Salmela-Aro et al., 2011) was used. Three items capturing the level of emotional exhaustion ( $\alpha = .74$ ; e.g., “I am snowed under/feel overwhelmed at work”) were measured with a 6-point Likert scale (1 = *completely disagree*; 6 = *completely agree*). A mean score of the three items was used in the analyses.

### **Statistical analyses**

#### **Exploratory factor analysis**

Exploratory factor analysis (EFA) was used to analyze the covariance among the 16 items pertaining to the teachers’ engagement using IBM SPSS 26. The data was obtained from the 120 teachers participating in the larger study. Suitability of the data for EFA was assessed (coefficients  $\geq .50$ ; Kaiser-Meyer-Olkin value = .81; Bartlett’s Test of Sphericity  $p < 0.001$ ). EFA results (see Appendix A) revealed the four-factor solution which explained a total of 54.23% of the variance. The result of the EFA and the previous validation study (Klassen et al., 2013) were regarded as support for the use of the four listed factors on teachers’ engagement.

#### **Interaction test**

Based on the correlation matrix, a positive association between gender and instructional support was found. However, a positive association between subject and instructional support was also indicated. To check the impact of subject on the correlation between gender and teacher–student interactions, a two-way between-groups analysis of variance (ANOVA) was conducted. To briefly report the results in this section, the ANOVA reflected the presence of an interaction between subject and emotional support, as well as between subject and classroom organization. There was no statistically significant interaction, but an interaction tendency, between subject and instructional support. An interaction term for standardized values of gender and subject was therefore used in the regression models.



### ***Multivariate regression***

Hierarchical multiple regression with bootstrapping was used to investigate the extent to which occupational well-being is related to the quality of teacher–student interactions, after controlling for the effects of gender, subject, the interaction of gender and subject, and work experience. Based on the suggestions that variables with greater theoretical importance could also be given early entry, or that the opposite tack could be taken (Tabachnick & Fidell, 2013), both orders of positive aspects of occupational well-being and then the negative aspects (or vice versa) were preliminarily tested. The preliminary analyses showed that teachers' occupational stress was statistically significantly associated with the quality of teacher–student interactions. Therefore, the negative well-being variables were then manipulated in later steps, with “nuisance” variables (teachers' background variables, then positive teachers' well-being variables) given higher priority for entry (Tabachnick & Fidell, 2013). The choice of regression with bootstrapping ensures the validity of the test with a small sample size. Separate models were generated for domains of CLASS (emotional support, classroom organization, and instructional support).

## **Results**

### ***Descriptive statistics***

Descriptive statistics for study variables are shown in Table 1. Among the domains of teacher–student interaction quality, on average, instructional support was the lowest ( $M = 3.97$ ), while classroom organization and emotional support presented with a higher mean of  $M = 5.98$  and  $M = 4.34$ , respectively. In relation to occupational well-being, emotional engagement was the highest ( $M = 4.28$ ) among the positive aspects, and job demands was the highest ( $M = 4.28$ ) among the negative aspects.

### ***Correlations***

Pearson correlation coefficients between the constructs of occupational well-being and the domains of teacher–student interactions are shown in Table 1. Teachers' emotional engagement was negatively related to instructional support: the higher the emotional engagement the teacher had, the lower the observed instructional support was in the classrooms. Teachers' experience of occupational stress had a strong negative correlation with the quality of emotional support, classroom organization, and instructional support. In addition, the quality of instructional support had a strong negative association with occupational stress, job demands, and emotional exhaustion.

### ***Multivariate regression***

#### ***Teachers' background characteristics***

Teachers' background characteristics were included in the regression models as control variables. First, models for emotional support (Table 2) showed that the subject the teacher taught was negatively related to emotional support: the mathematic lessons had lower observed emotional support in classrooms when compared to the language arts lessons. Second, models for classroom organization (Table 3) showed that work experience was positively related to classroom organization: the higher the number of years of experience the teachers had, the higher the quality of the classroom organization. Third, models for instructional support (Table 4) showed that the subject (mathematics or language arts) had a marginal positive relation to instructional support: the instructional support was higher in the mathematic lessons when compared to the language arts lessons.

**Table 1.** Descriptive statistics and correlations for study variables.

|                                            | Descriptive |      |      |      |      | Correlations |       |      |                   |       |                   |      |        |        |                   |       |       |    |
|--------------------------------------------|-------------|------|------|------|------|--------------|-------|------|-------------------|-------|-------------------|------|--------|--------|-------------------|-------|-------|----|
|                                            | N (%)       | Min. | Max. | M    | SE   | 1            | 2     | 3    | 4                 | 5     | 6                 | 7    | 8      | 9      | 10                | 11    | 12    | 13 |
| Background                                 |             |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| 1. Gender <sup>a</sup>                     |             |      |      |      |      | -            |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| Female                                     | 32 (66.7%)  |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| Male                                       | 16 (33.3%)  |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| 2. Subject <sup>b</sup>                    |             |      |      |      |      | .47**        | -     |      |                   |       |                   |      |        |        |                   |       |       |    |
| Language arts                              | 25 (52.1%)  |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| Mathematics                                | 23 (47.9%)  |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| 3. Gender–Subject Interaction <sup>c</sup> |             |      |      |      |      | .37**        | .04   | -    |                   |       |                   |      |        |        |                   |       |       |    |
| 4. Work experience                         |             |      |      |      |      | -.13         | -.11  | -.07 | -                 |       |                   |      |        |        |                   |       |       |    |
| less than one year                         | 0           |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| 1 to 5 years                               | 8 (16.7%)   |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| 6 to 10 years                              | 9 (18.8%)   |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| 11 to 15 years                             | 7 (14.6%)   |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| more than 15 years                         | 23 (47.9%)  |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| missing system                             | 1 (2.1%)    |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| Occupational well-being                    |             |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| 5. Cognitive engagement                    | 47          | 3.00 | 5.00 | 4.01 | 0.07 | -.11         | .07   | -.07 | -.01              | -     |                   |      |        |        |                   |       |       |    |
| 6. Emotional engagement                    | 48          | 2.50 | 5.00 | 4.28 | 0.10 | -.23         | -.05  | .11  | -.27 <sup>+</sup> | .31*  | -                 |      |        |        |                   |       |       |    |
| 7. Social engagement: students             | 48          | 2.25 | 5.00 | 3.90 | 0.09 | -.19         | -.13  | -.09 | -.21              | .49** | .54**             | -    |        |        |                   |       |       |    |
| 8. Occupational stress                     | 43          | 1.00 | 6.00 | 2.58 | 0.16 | -.13         | -.22  | -.21 | -.07              | .02   | -.29 <sup>+</sup> | -.02 | -      |        |                   |       |       |    |
| 9. Job demands                             | 47          | 1.75 | 6.00 | 3.99 | 0.13 | -.29*        | -.30* | -.08 | .12               | .10   | -.24              | -.05 | .54**  | -      |                   |       |       |    |
| 10. Emotional exhaustion                   | 48          | 1.00 | 5.00 | 2.81 | 0.12 | -.20         | -.22  | .04  | .03               | .14   | -.17              | -.12 | .61**  | .70**  | -                 |       |       |    |
| Teacher–student interactions               |             |      |      |      |      |              |       |      |                   |       |                   |      |        |        |                   |       |       |    |
| 11. Emotional support                      | 48          | 2.33 | 5.89 | 4.34 | 0.11 | .10          | -.17  | .33* | .17               | -.03  | .11               | -.03 | -.49** | -.01   | -.14              | -     |       |    |
| 12. Classroom organization                 | 48          | 3.89 | 6.89 | 5.98 | 0.11 | .30*         | .12   | .29* | .35*              | -.06  | .04               | -.03 | -.51** | -.15   | -.27 <sup>+</sup> | .70** | -     |    |
| 13. Instructional support                  | 48          | 2.50 | 5.18 | 3.97 | 0.09 | .53**        | .47** | .23  | -.03              | -.07  | -.19              | -.11 | -.46** | -.39** | -.37**            | .48** | .54** | -  |

<sup>a</sup>Z-score for gender (0 = female and 1 = male).<sup>b</sup>Z-score for subject (0 = language arts and 1 = mathematics).<sup>c</sup>Interaction term of gender Z-score and subject Z-score.\* $p < .05$  (2-tailed).\*\* $p < .01$  (2-tailed).<sup>+</sup> $.05 \leq p \leq .09$ .

**Table 2.** Hierarchical multiple regression results for emotional support.

|                                            | Model 1 |                       |       | Model 2 |                       |       | Model 3           |                       |       | Model 4           |                       |       | Model 5 |                       |       | Model 6          |                       |       | Model 7          |                       |       |
|--------------------------------------------|---------|-----------------------|-------|---------|-----------------------|-------|-------------------|-----------------------|-------|-------------------|-----------------------|-------|---------|-----------------------|-------|------------------|-----------------------|-------|------------------|-----------------------|-------|
|                                            | B       | BCa 95%<br>Conf. Int. |       | B       | BCa 95%<br>Conf. Int. |       | B                 | BCa 95%<br>Conf. Int. |       | B                 | BCa 95%<br>Conf. Int. |       | B       | BCa 95%<br>Conf. Int. |       | B                | BCa 95%<br>Conf. Int. |       | B                | BCa 95%<br>Conf. Int. |       |
|                                            |         | Lower                 | Upper |         | Lower                 | Upper |                   | Lower                 | Upper |                   | Lower                 | Upper |         | Lower                 | Upper |                  | Lower                 | Upper |                  | Lower                 | Upper |
| (Constant)                                 | 3.72**  | 2.86                  | 4.55  | 3.14**  | 1.25                  | 5.01  | 2.32 <sup>+</sup> | -.64                  | 4.92  | 2.34 <sup>+</sup> | -.38                  | 4.83  | 3.85**  | 1.44                  | 5.62  | 3.66*            | 1.24                  | 5.20  | 3.63*            | .45                   | 5.77  |
| Gender <sup>a</sup>                        | .08     | -.11                  | .27   | .09     | -.09                  | .30   | .16               | -.06                  | .38   | .16               | -.08                  | .43   | .11     | -.11                  | .43   | .13              | -.09                  | .53   | .12              | -.11                  | .56   |
| Subject <sup>b</sup>                       | -.17    | -.42                  | .07   | -.19    | -.45                  | .05   | -.23 <sup>+</sup> | -.54                  | .05   | -.23 <sup>+</sup> | -.56                  | .10   | -.27*   | -.53                  | -.02  | -.26*            | -.59                  | .05   | -.27*            | -.53                  | .02   |
| Gender-Subject<br>interaction <sup>c</sup> | .29**   | .10                   | .49   | .30**   | .09                   | .47   | .26*              | .01                   | .49   | .26*              | .01                   | .51   | .20*    | -.08                  | .38   | .19 <sup>+</sup> | -.13                  | .41   | .20 <sup>+</sup> | -.12                  | .43   |
| Work experience                            | .13     | -.07                  | .35   | .13     | -.07                  | .36   | .16               | -.04                  | .44   | .16               | -.05                  | .47   | .10     | -.09                  | .42   | .10              | -.11                  | .44   | .10              | -.05                  | .38   |
| Cognitive engagement                       |         |                       |       | .14     | -.18                  | .45   | .06               | -.33                  | .35   | .07               | -.38                  | .40   | .15     | -.25                  | .37   | .12              | -.30                  | .35   | .15              | -.62                  | .61   |
| Emotional engagement                       |         |                       |       |         |                       |       | .24               | -.27                  | .78   | .26               | -.29                  | .82   | .03     | -.44                  | 1.08  | .05              | -.56                  | 1.53  | .06              | -.26                  | .98   |
| Social engagement:<br>students             |         |                       |       |         |                       |       |                   |                       |       | -.03              | -.59                  | .54   | .02     | -.41                  | .48   | .01              | -.40                  | .42   | -.01             | -.54                  | .46   |
| Occupational stress                        |         |                       |       |         |                       |       |                   |                       |       |                   |                       |       | -.31**  | -.49                  | -.15  | -.33**           | -.55                  | -.16  | -.30*            | -.63                  | -.01  |
| Job demands                                |         |                       |       |         |                       |       |                   |                       |       |                   |                       |       |         |                       |       | .08              | -.24                  | .44   | .12              | -.20                  | .47   |
| Emotional exhaustion                       |         |                       |       |         |                       |       |                   |                       |       |                   |                       |       |         |                       |       |                  |                       |       | -.11             | -.61                  | .30   |

Note. Regression with bootstrapping performed.  $N = 48$ . BCa 95% Conf. Int. = Bias corrected accelerated 95% confidence interval.

<sup>a</sup>Z-score for gender (0 = female and 1 = male).

<sup>b</sup>Z-score for subject (0 = language arts and 1 = mathematics).

<sup>c</sup>Interaction term of gender Z-score and subject Z-score.

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$ .

<sup>+</sup>. $05 \leq p \leq .09$ . VIF above 10: none (max. +2.55).

**Table 3.** Hierarchical multiple regression results for classroom organization.

|                                            | Model 1 |                       |       | Model 2 |                       |       | Model 3 |                       |       | Model 4 |                       |       | Model 5 |                       |       | Model 6 |                       |       | Model 7 |                       |       |
|--------------------------------------------|---------|-----------------------|-------|---------|-----------------------|-------|---------|-----------------------|-------|---------|-----------------------|-------|---------|-----------------------|-------|---------|-----------------------|-------|---------|-----------------------|-------|
|                                            | B       | BCa 95%<br>Conf. Int. |       | B       | BCa 95%<br>Conf. Int. |       | B       | BCa 95%<br>Conf. Int. |       | B       | BCa 95%<br>Conf. Int. |       | B       | BCa 95%<br>Conf. Int. |       | B       | BCa 95%<br>Conf. Int. |       | B       | BCa 95%<br>Conf. Int. |       |
|                                            |         | Lower                 | Upper |         | Lower                 | Upper |         | Lower                 | Upper |         | Lower                 | Upper |         | Lower                 | Upper |         | Lower                 | Upper |         | Lower                 | Upper |
| (Constant)                                 | 4.90**  | 3.97                  | 5.79  | 5.20**  | 3.16                  | 7.16  | 4.33**  | 1.90                  | 6.57  | 4.28**  | 1.75                  | 6.58  | 5.77**  | 3.29                  | 7.62  | 5.30**  | 2.72                  | 7.16  | 5.29**  | 2.15                  | 7.78  |
| Gender <sup>a</sup>                        | .16     | -.07                  | .43   | .15     | -.09                  | .44   | .22     | -.05                  | .53   | .22     | -.07                  | .56   | .17     | -.08                  | .55   | .22     | -.04                  | .78   | .22     | -.04                  | .73   |
| Subject <sup>b</sup>                       | .11     | -.23                  | .39   | .12     | -.21                  | .37   | .07     | -.30                  | .36   | .08     | -.33                  | .38   | .04     | -.26                  | .32   | .07     | -.32                  | .39   | .07     | -.25                  | .35   |
| Gender–Subject<br>interaction <sup>c</sup> | .15     | -.14                  | .41   | .15     | -.14                  | .41   | .11     | -.18                  | .41   | .12     | -.20                  | .41   | .07     | -.23                  | .29   | .05     | -.36                  | .33   | .05     | -.36                  | .35   |
| Work experience                            | .27*    | .08                   | .46   | .27*    | .08                   | .49   | .30*    | .08                   | .56   | .30*    | .08                   | .60   | .25*    | .02                   | .59   | .24*    | .02                   | .65   | .24*    | .09                   | .51   |
| Cognitive engagement                       |         |                       |       | -.07    | -.62                  | .40   | -.17    | -.65                  | .27   | -.20    | -.71                  | .29   | -.12    | -.54                  | .18   | -.19    | -.56                  | -.03  | -.18    | -.89                  | .26   |
| Emotional engagement                       |         |                       |       |         |                       |       | .26     | -.18                  | .73   | .22     | -.25                  | .80   | .00     | -.43                  | .94   | .05     | -.47                  | 1.50  | .05     | -.26                  | .85   |
| Social engagement:<br>students             |         |                       |       |         |                       |       |         |                       |       | .08     | -.32                  | .46   | .14     | -.21                  | .44   | .12     | -.19                  | .37   | .11     | -.32                  | .46   |
| Occupational stress                        |         |                       |       |         |                       |       |         |                       |       |         |                       |       | -.30**  | -.50                  | -.05  | -.37**  | -.65                  | -.09  | -.36*   | -.65                  | -.04  |
| Job demands                                |         |                       |       |         |                       |       |         |                       |       |         |                       |       |         |                       |       | .21     | -.25                  | .71   | .22     | -.13                  | .65   |
| Emotional exhaustion                       |         |                       |       |         |                       |       |         |                       |       |         |                       |       |         |                       |       |         |                       |       | -.03    | -.49                  | .41   |

Note. Regression with bootstrapping performed.  $N = 48$ . BCa 95% Conf. Int. = Bias corrected accelerated 95% confidence interval.

<sup>a</sup>Z-score for gender (0 = female and 1 = male).

<sup>b</sup>Z-score for subject (0 = language arts and 1 = mathematics).

<sup>c</sup>Interaction term of gender Z-score and subject Z-score.

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$ .

<sup>+</sup> $.05 \leq p \leq .09$ . VIF above 10: none (max. +2.55).

**Table 4.** Hierarchical multiple regression results for instructional support.

|                                            | Model 1 |                       | Model 2 |         | Model 3               |       | Model 4          |                       | Model 5 |                  | Model 6               |       | Model 7           |                       |       |                  |       |      |                   |      |      |
|--------------------------------------------|---------|-----------------------|---------|---------|-----------------------|-------|------------------|-----------------------|---------|------------------|-----------------------|-------|-------------------|-----------------------|-------|------------------|-------|------|-------------------|------|------|
|                                            | B       | BCa 95%<br>Conf. Int. |         | B       | BCa 95%<br>Conf. Int. |       | B                | BCa 95%<br>Conf. Int. |         | B                | BCa 95%<br>Conf. Int. |       | B                 | BCa 95%<br>Conf. Int. |       |                  |       |      |                   |      |      |
|                                            |         | Lower                 | Upper   |         | Lower                 | Upper |                  | Lower                 | Upper   |                  | Lower                 | Upper |                   | Lower                 | Upper |                  |       |      |                   |      |      |
| (Constant)                                 | 3.77*** | 3.71                  | 4.14    | 4.02*** | 2.29                  | 5.58  | 4.37***          | 1.66                  | 6.26    | 4.28***          | 1.60                  | 6.20  | 5.50***           | 2.94                  | 7.05  | 5.82***          | 3.11b | 7.88 | 5.82***           | 3.04 | 7.94 |
| Gender <sup>a</sup>                        | .24**   | .09                   | .39     | .24**   | .06                   | .40   | .21 <sup>+</sup> | .00                   | .44     | .20              | -.03                  | .45   | .16               | -.04                  | .46   | .12              | -.10  | .43  | .12               | -.09 | .35  |
| Subject <sup>b</sup>                       | .16     | -.07                  | .37     | .16     | -.08                  | .39   | .18 <sup>+</sup> | -.06                  | .40     | .19 <sup>+</sup> | -.05                  | .43   | .16*              | -.02                  | .36   | .15 <sup>+</sup> | -.04  | .33  | .14 <sup>+</sup>  | -.06 | .32  |
| Gender–Subject<br>interaction <sup>c</sup> | .10     | -.05                  | .26     | .10     | -.07                  | .27   | .11              | -.07                  | .32     | .12              | -.05                  | .33   | .08               | -.09                  | .22   | .09              | -.08  | .25  | .09               | -.09 | .26  |
| Work experience                            | .04     | -.10                  | .19     | .04     | -.09                  | .19   | .03              | -.12                  | .23     | .03              | -.12                  | .23   | -.02              | -.15                  | .19   | -.01             | -.16  | .19  | -.01              | -.13 | .17  |
| Cognitive engagement                       |         |                       |         | -.06    | -.34                  | .20   | -.02             | -.34                  | .27     | -.07             | -.42                  | .26   | -.01              | -.29                  | .18   | .03              | -.31  | .34  | .04               | -.41 | .42  |
| Emotional engagement                       |         |                       |         |         |                       |       | -.10             | -.58                  | .35     | -.16             | -.66                  | .34   | -.34 <sup>+</sup> | -.68                  | .33   | -.37*            | -.72  | .25  | -.37 <sup>+</sup> | -.66 | .17  |
| Social engagement:<br>students             |         |                       |         |         |                       |       |                  |                       |         | .12              | -.18                  | .51   | .17               | -.12                  | .50   | .18              | -.13  | .54  | .18               | -.21 | .59  |
| Occupational stress                        |         |                       |         |         |                       |       |                  |                       |         |                  |                       |       | -.25***           | -.37                  | -.05  | -.20**           | -.39  | .08  | -.19*             | -.35 | .06  |
| Job demands                                |         |                       |         |         |                       |       |                  |                       |         |                  |                       |       |                   |                       |       | -.14             | -.40  | .02  | -.14              | -.47 | .11  |
| Emotional exhaustion                       |         |                       |         |         |                       |       |                  |                       |         |                  |                       |       |                   |                       |       |                  |       |      | -.01              | -.42 | .26  |

Note. Regression with bootstrapping performed.  $N = 48$ . BCa 95% Conf. Int. = Bias corrected accelerated 95% confidence interval.

<sup>a</sup>Z-score for gender (0 = female and 1 = male).

<sup>b</sup>Z-score for subject (0 = language arts and 1 = mathematics).

<sup>c</sup>Interaction term of gender Z-score and subject Z-score.

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$ .

<sup>+</sup> $.05 \leq p \leq .09$ . VIF above 10: none (max. +2.55).

### ***Occupational well-being in relation to emotional support***

As shown in Table 2, when the background characteristics and other constructs of the well-being variables were controlled, none of the teachers' engagement factors showed associations with emotional support. However, occupational stress showed a negative association with emotional support, suggesting that the more occupational stress the teacher has, the lower the quality of observed emotional support will be. Further, in the final model (Model 7), the subject, interaction term, and occupational stress were statistically significant predictors of emotional support.

### ***Occupational well-being in relation to classroom organization***

As shown in Table 3, none of teachers' engagement factors were linked to classroom organization. However, in terms of the teachers' experience of stress, occupational stress demonstrated a strong negative association with classroom organization, suggesting that the higher the occupational stress the teacher reported, the lower the quality of classroom organization observed in the classrooms. Further, in the final model (Model 7), only work experience and occupational stress were statistically significant predictors of classroom organization, with occupational stress recording a moderately higher beta value.

### ***Occupational well-being in relation to instructional support***

As shown in Table 4, emotional engagement was negatively related to instructional support before controlling for emotional exhaustion (see Model 6). It was marginally significant in relation to instructional support when controlling for all the variables (see Model 7): as the emotional engagement reported by the teacher rose higher, a tendency toward lower instructional support in the classrooms was observed. Secondly, for the teachers' experience of stress, occupational stress showed a negative association with instructional support, suggesting that the higher the occupational stress the teacher reported, the lower the quality of observed instructional support. Lastly, in the final model (Model 7), while subject and emotional engagement were not statistically significant in association with instructional support, occupational stress showed a statistically significant negative association with it.

## **Discussion**

This study aims to contribute to our understanding of how teachers' occupational well-being is related to the quality of observed teacher–student interactions in lower secondary school classrooms. The results showed that teachers who reported higher occupational stress were observed with a lower quality of emotional support, classroom organization, and instructional support.

Considering the relations between teachers' engagement and the quality of teacher–student interactions (Hypothesis 1), in contrast with earlier findings (Penttinen et al., 2020), the current study demonstrated the possible role of emotional engagement in teachers' instructional practices, with a significant negative association without controlling for the effect of emotional exhaustion, and a marginally significant negative association overall. More investigation is needed to tap the complexity of the association between different aspects of teacher occupational well-being and the quality of instructional support in authentic classrooms.

Considering the relations between teachers' occupational stress and the quality of interactions, results are in line with Hypothesis 2a. Results indicated that the quality of teacher–student interactions is prone to teacher work-related stress. Pursuant to the prosocial classroom model (Jennings & Greenberg, 2009) proposing that teachers' well-being is critical for favorable behaviors and relationships in classrooms, when teachers are stressed, they may be less sensitive to students' perspectives and needs (i.e., lower emotional support), less effective in managing students' behavior and productivity (i.e., less effective classroom organization), and may pay less attention to fostering higher-order thinking skills and deeper content understanding (i.e., lower instructional support). It is also possible that the presence of the less favorable interactions (e.g., a high level of student

misbehavior and poor classroom atmosphere), in turn, lead to teacher stress (Lazarus, 1999; Schaufeli & Bakker, 2004). Such complicated dynamics could possibly lead to not just a causal relation but also a reciprocal link (Donker et al., 2020); thus, further longitudinal investigation is needed. By observing teachers' occupational well-being and interaction quality with three or more time points, it is possible to investigate directionality of the effect.

However, regarding teachers' experience with job demands, in contrast to Hypothesis 2b, there was no negative association with interaction quality. It seems that even when the teachers expose themselves to high job demands which could lead to overwork and feelings of pressure (Siegrist, 1996; Siegrist et al., 2004), the quality of their concurrent interactions with students is not necessarily affected.

Similarly, although it was hypothesized (Hypothesis 2c) that the prolonged experience of stress (i.e., emotional exhaustion) would be negatively related to all three interaction domains, emotional exhaustion did not associate with any of the three domains. There was only a tendency for emotional exhaustion to be negatively correlated with instructional support, although it was not found in the regression models when controlling for other elements. Contrary to the Job Demands-Resources model (Bakker & Demerouti, 2008; Schaufeli & Bakker, 2004), it seems that the wearing-out process does not necessarily induce a significant influence on the quality of teacher–student interactions. In other words, it seems that when teachers experience job demands, their state of burnout does not necessarily associate with the interaction quality in the classrooms.

Furthermore, instructional support not only showed an association with occupational stress, but also a tendency of association with job demands and with emotional exhaustion. Although the same was not shown in regression models, it is suggested that more attention should be paid to the quality of instructional support when investigating teachers' well-being. As mentioned above, instructional support is usually at the lowest level among the domains; more knowledge is needed on the mechanisms between teachers' well-being and the quality of interactions (for example, could instructional support be a potential marker of teachers' occupational well-being). An investigation on the possible mechanisms between the quality of instructional support and occupational well-being could be a potential research direction in the future.

In addition, considering the particular population of teachers of the current study, the protective factors that are interwoven in the Finnish educational system could also play a part in the complexity of teachers' occupational well-being and interaction quality. For example, in Finland, supervisory support is often expressed as a form of servant leadership (Russell & Stone, 2002), which emphasizes shared leadership, development to increase employees' autonomy and capacities for their work tasks (Russell & Stone, 2002; Upadaya & Salmela-Aro, 2020). Such type of leadership in Finnish schools may serve as great social resource during teaching, promoting high engagement, and hindering job burnout among teachers (Upadaya & Salmela-Aro, 2020). Second, teachers in Finland practice teamwork including co-planning and co-teaching. Such job resources located at the level of interpersonal and social relations at schools (i.e., supervisor and co-worker support, team climate), could help in reducing burnout symptoms (Hoglund et al., 2015) and promote job engagement (Bakker & Demerouti, 2007). The above mentioned potential protective factors and their mechanisms are in line with the JD-R model stating that social resources and demands also play an important role in teacher's occupational well-being, thus influencing their job performance including interaction quality (Bakker & Demerouti, 2008; Schaufeli & Bakker, 2004).

Overall, the results reflected that teachers' occupational stress and emotional engagement are related differently to the three domains of teacher–student interactions. It seems that teachers' occupational stress is reflected in their emotional, organizational, and instructional behaviors, whereas teachers' emotional engagement could be reflected in the instructional aspect of teaching. We therefore suggest further investigation on the underlying mechanisms of these different associations in detail, with the consideration of classroom activities at different school levels, and the possible variability of occupational well-being across time—these investigations will contribute to



the knowledge output relating to teachers' well-being in relation to work-related factors (Hascher & Waber, 2021). Understanding the mechanisms could offer a foundation to support teachers at different stages of their teaching careers. For example, it was suggested that teachers' engagement constructs could change in predictable ways throughout different stages of their careers (Klassen et al., 2013). It could therefore be beneficial to offer interventions to pre-service and in-service teachers to foster their awareness of the relations between types of engagement, types of experienced stress, and teacher–student interaction quality, so as to cultivate their positive well-being and the desired teacher–student interactions for their stage of career.

## Limitations

Some limitations need to be considered when interpreting and generalizing these findings. First, due to the small sample size, it is not suggested to use the results for generalization. Second, causality cannot be discovered in this cross-sectional study. Similarly, hierarchical regression does not prove causation but correlation (Pallant, 2016; Tabachnick & Fidell, 2013). Therefore, the mechanism of the association identified in the results could, in reality, be in both directions or in one specific direction which would need further research using data collected over time. Third, comparing the teacher engagement measurement tools that were used in the present study and in previous studies (e.g., Penttinen et al., 2020), the differences in results could be caused by the fact that the measure used in the previous results was the Utrecht Work Engagement Scale (UWES; Schaufeli & Bakker, 2004), whereas the ETS used in the current study advanced the development of teachers' engagement research in education by providing a context-specific construct for the workers in the teaching professions (Klassen et al., 2013). Yet, it should also be noted that the ETS was previously positively correlated with the commonly used measurement tool, UWES (Klassen et al., 2013). Moreover, with the ETS, the physical engagement aspect might emerge in the four factors of the scale due to the characteristics of the teaching duties (Klassen et al., 2013). Therefore, all together, this leaves an interesting question on how this emerged physical engagement aspect embeds and affects the realization of emotional, cognitive, and social engagement, and how these all interact together with the quality of teachers–student interactions. Lastly, it should be noted that the data used in the current study was collected 8 years ago. During the COVID-19 pandemic, different job demands increased (Kim et al., 2022) and teachers experienced their occupational well-being in different ways (Pöysä et al., 2021, 2022; Salmela-Aro et al., 2020). Therefore, to further investigate teachers' occupational well-being and interaction quality in the post-COVID era, more attention should be paid to how the COVID-19 pandemic could have affected teachers' well-being (e.g. role of resilience, Cho et al., 2021; teachers' individual experiences, Pöysä et al., 2021; and school characteristics, Westphal et al., 2022).

## Conclusion

This study is among the first ones to examine the link between teachers' occupational well-being and observed interaction quality in lower secondary education. It is reflected that improving the well-being of teachers has the potential to improve the quality of teacher–student interactions. Further investigation on the mechanisms between well-being and teacher–student interactions and how they are built is essential. Such further discernment of the overall construct of teachers' occupational well-being and its relations with teacher–student interaction quality is essential for developing a higher-quality classroom environment and a healthier teaching profession. Finally, the current study also provides some practical implications. Knowledge about work-related stress and the importance of being able to deal with it (e.g., resilience for secondary school teachers; Brouskeli et al., 2018) is imperative in teacher preparation. Thus, more attention should be paid to the relations between interaction quality and occupational well-being experienced already by the student-teachers.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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## ORCID

Sze Wah Chan  <http://orcid.org/0000-0001-6994-0525>

Sanni Pöysä  <http://orcid.org/0000-0002-5059-9459>

Marja-Kristiina Lerkkanen  <http://orcid.org/0000-0002-5709-5800>

Eija Pakarinen  <http://orcid.org/0000-0001-7190-6705>

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## Appendix A

### Factor analysis of teachers' engagement scale

| Teacher engagement scale item                                       | Factor loading |            |            |            |
|---------------------------------------------------------------------|----------------|------------|------------|------------|
|                                                                     | 1              | 2          | 3          | 4          |
| Factor 1: Cognitive engagement                                      |                |            |            |            |
| 14. While teaching, I really "throw" myself into my work.           | <b>.82</b>     | .14        | −.06       | .06        |
| 10. While teaching, I pay a lot of attention to my work.            | <b>.62</b>     | −.16       | .02        | −.05       |
| 6. While teaching, I work with intensity.                           | <b>.55</b>     | .01        | .13        | .01        |
| 12. I try my hardest to perform well while teaching.                | <b>.53</b>     | .05        | .07        | .01        |
| Factor 2: Emotional engagement                                      |                |            |            |            |
| 1. I love teaching.                                                 | −.04           | <b>.94</b> | −.10       | .02        |
| 9. I find teaching fun.                                             | −.03           | <b>.90</b> | −.01       | .05        |
| 16. I am excited about teaching.                                    | .19            | <b>.79</b> | .02        | −.12       |
| 4. I feel happy while teaching.                                     | −.12           | <b>.70</b> | .24        | .02        |
| Factor 3: Social engagement with students                           |                |            |            |            |
| 11. In class, I show warmth to my students.                         | .06            | −.001      | <b>.75</b> | −.02       |
| 3. In class, I am empathetic toward my students.                    | −.14           | .14        | <b>.73</b> | −.02       |
| 15. In class, I care about the problems of my students.             | .15            | .01        | <b>.68</b> | −.05       |
| 8. In class, I am aware of my students' feelings.                   | .15            | −.08       | <b>.60</b> | .05        |
| Factor 4: Social engagement with colleagues                         |                |            |            |            |
| 13. At school, I am committed to helping my colleagues.             | .10            | .09        | −.21       | <b>.72</b> |
| 7. At school, I connect well with my colleagues.                    | −.01           | −.09       | −.02       | <b>.64</b> |
| 2. At school, I value the relationships I build with my colleagues. | −.13           | .14        | .14        | <b>.55</b> |
| 5. At school, I care about the problems of my colleagues.           | .01            | −.14       | .30        | <b>.52</b> |

Note.  $N = 120$ . Principal Axis Factoring (PAF) with promax rotation. Factor loading over .30 are in bold. Permission of items publication obtained from corresponding author of Klassen et al, 2013.