Learning and Instruction 50 (2017) 21–30

Contents lists available at ScienceDirect

Learning and Instruction

journal homepage: www.elsevier.com/locate/learninstruc

Does basic need satisfaction mediate the link between stress exposure and well-being? A diary study among beginning teachers

Karen Aldrup [a, *], Uta Klusmann [a], Oliver Lüdtke [a, b]

[a] Leibniz Institute for Science and Mathematics Education, Germany
[b] Centre for International Student Assessment, Germany

ARTICLE INFO

Article history:
Received 14 January 2016
Received in revised form
18 August 2016
Accepted 10 November 2016
Available online 30 November 2016

Keywords:
Self-determination theory
Need for relatedness
Emotional exhaustion
Work enthusiasm
Teacher stress

ABSTRACT

An imbalance between work-related stressors and resources, which we refer to as stress exposure, is often found to impair teachers' occupational well-being. However, the psychological mechanisms that explain this relationship are mostly unknown. We assumed that satisfaction of the basic psychological needs for competence, relatedness with students, and relatedness with colleagues acts as a mediator. To test this assumption, we conducted a two-week diary study with 152 beginning teachers. A multilevel within-subject mediation analysis showed that teachers felt less work enthusiasm and more emotional exhaustion on days when stress exposure was high. Whereas the needs for competence and relatedness with students explained the association with work enthusiasm, the need for competence mediated the relationship with emotional exhaustion. Additionally, the least experienced teachers felt more emotional exhaustion when the need for relatedness with students was not satisfied. These findings add to our understanding of the daily intra-individual processes affecting beginning teachers' occupational well-being.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

1. Introduction

Beginning teachers' occupational well-being is a major concern. The transition from university to practice is often described as particularly stressful and is associated with high attrition rates (Dicke et al., 2015; Smith & Ingersoll, 2004). Moreover, teachers' occupational well-being affects the quality of teaching, student motivation, and student achievement (Arens & Morin, 2016; Klusmann, Kunter, Trautwein, Lüdtke, & Baumert, 2008b; Klusmann, Richter, & Lüdtke, 2016; Shen et al., 2015).

Theoretical models (e.g., job demands-resources model; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) suggest that an imbalance between work-related resources and stressors, which we refer to as *stress exposure*, strongly affects occupational well-being. A vast body of research supports this assumption. However, little is known about the psychological mechanisms underlying these relationships. Furthermore, the daily processes that explain intra-individual variations in well-being have not been investigated up until now. We suggest that daily stress exposure, e.g., a lack of student discipline or of social support from colleagues (Chaplain, 2008; Hakanen, Bakker, & Schaufeli, 2006), accounts for daily changes in beginning teachers' occupational well-being because it inhibits fulfillment of the basic psychological needs for competence, relatedness with students, and relatedness with colleagues. Additionally, we explored whether there are inter-individual differences regarding these processes.

To test these assumptions, we conducted a two-week diary study with 152 teachers, in which they reported on daily stress exposure, basic need satisfaction, and well-being, as indicated by work enthusiasm and emotional exhaustion. Using a within-subject mediation analysis, we modeled the daily intra-individual processes affecting well-being. We also examined the extent to which each of the basic needs contributes to teachers' occupational well-being. Finally, we explored whether teachers differ in these relations and whether these variations can be explained by years of job experience.

1.1. Teachers' occupational well-being

Teachers' occupational well-being can be described as their optimal psychological functioning and experience regarding their

* Corresponding author. Leibniz Institute for Science and Mathematics Education, University of Kiel, Olshausenstr. 62, 24118 Kiel, Germany.
E-mail address: aldrup@ipn.uni-kiel.de (K. Aldrup).

http://dx.doi.org/10.1016/j.learninstruc.2016.11.005
0959-4752/© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

work as a teacher (Ryan & Deci, 2001). On the one hand, this means that they are engaged and enthusiastic about teaching, which is accompanied by feelings of enjoyment, excitement, and pleasure (Kunter et al., 2008). These positive emotions are reflected in the quality of teachers' instruction and affect students' motivation and learning outcomes (Keller, Goetz, Becker, Morger, & Hensley, 2014; Kunter et al., 2013). On the other hand, well-being requires teachers to experience low levels of stress and burnout. In the present study, we focus on the central quality of burnout: emotional exhaustion, which refers to the stress dimension of burnout and includes feelings of strain and the depletion of one's emotional resources (Maslach, Schaufeli, & Leiter, 2001). This lack of resources impedes teachers in creating a stimulating learning environment and, consequently, students' school satisfaction, engagement, and achievement diminish (Arens & Morin, 2016; Klusmann et al., 2008b; Klusmann et al., 2016; Shen et al., 2015). Hence, identifying the sources of teachers' work enthusiasm and emotional exhaustion is an important task.

1.2. Stress exposure as a predictor of occupational well-being

The job demands-resources model (Demerouti et al., 2001) proposes that a variety of job resources and stressors interact to explain the positive as well as the negative dimension of occupational well-being. According to Demerouti et al. (2001), stressors are aspects of one's job that are associated with physiological and/or psychological costs because they require prolonged effort or skill; job resources, among other things, reduce stressors and the associated costs. The job demands-resources model differs from previous models (e.g., demand-control model, Karasek, 1979; transactional model of stress and coping, Lazarus & Folkman, 1984; effort-reward imbalance model, Siegrist, 1996) because it is not limited to the negative dimension of well-being or to specific stressors and resources. Similar to those previous models, stress is seen as a consequence of work-related stressors outweighing the employee's resources. In line with this, prior studies indicated that an imbalance of stressors and resources is central in predicting well-being, which suggests that it is reasonable to investigate them in combination (Siegrist et al., 2004; de Jonge, Bosma, Peter, & Siegrist, 2000). Drawing on this, we see stress exposure as an imbalance between work-related resources and stressors that, as depicted in our heuristic working model (see Fig. 1, Hypothesis 1), affects occupational well-being.

For teachers, these stressors and resources may be located in class or outside class. The most prominent stressors in class are related to teacher-student interactions (Pyhältö, Pietarinen, & Salmela-Aro, 2011); primarily to student misbehavior and discipline problems (Fernet, Guay, Senécal, & Austin, 2012; Klusmann, Kunter, Trautwein, Lüdtke, & Baumert, 2008a; Skaalvik & Skaalvik, 2010). A lack of student motivation or conflicting teacher-student relationships have also been found to negatively affect teachers' well-being (Gastaldi, Pasta, Longobardi, Prino, & Quaglia, 2014; Kyriacou, 2001). Outside class, interactions with colleagues are often perceived as stressful (Kyriacou, 2001; Pyhältö et al., 2011). However, social support from colleagues and a positive social climate are also considered to be key resources (van Droogenbroeck, Spruyt, & Vanroelen, 2014; Hakanen et al., 2006; Pomaki, DeLongis, Frey, Short, & Woehrle, 2010; Skaalvik & Skaalvik, 2011), as are positive teacher-student relationships and student motivation (Jo, 2014; Kunter, Frenzel, Nagy, Baumert, & Pekrun, 2011; Veldman, van Tartwijk, Brekelmans, & Wubbels, 2013; van Droogenbroeck et al., 2014). One important shortcoming of these studies is the rather static perspective that interprets work-related stressors and resources as relatively stable characteristics of the work environment. Consequently, these studies tell us whether people who experience more stressors and have fewer resources also have lower levels of well-being, but we cannot infer how *intra*-individual variations in teachers' work-related experience are reflected in their daily well-being (Bolger & Laurenceau, 2013).

1.3. A daily perspective on teachers' occupational well-being

A growing number of researchers emphasizes that stressors and resources are prone to substantial variation and takes minor daily events into consideration (e.g., Bakker & Bal, 2010; Kitching, Morgan, & O'Leary, 2009; Simbula, 2010). Positive daily experiences that promote well-being are termed *uplifts*; negative daily experiences that threaten well-being are termed *hassles* (Lazarus, 1984). Consequently, uplifts and hassles correspond to work-related resources and stressors, respectively; the only difference is that they are fluctuating entities. In his stress model, Almeida (2005) picks up on these ideas. Moreover, he proposes that sociodemographic and psychosocial resilience and vulnerability factors moderate the strength of the relationship between daily experience and daily well-being. Drawing on Huberman's model of teacher development (Huberman, 1989), more job experience may be one moderator that reduces the impact of daily hassles (see Fig. 1, Hypothesis 3).

To capture the daily variations in uplifts and hassles, diary studies are frequently applied (for more information on their benefits and guidelines for their application see, e.g., Bolger & Laurenceau, 2013; Gunthert & Wenze, 2012; Zirkel, Garcia, & Murphy, 2015). They should include at least five measurement time points and usually last two weeks (Bolger & Laurenceau, 2013; Gunthert & Wenze, 2012). Daily diaries allow researchers to capture psychological processes as they unfold in everyday life, which also reduces retrospective bias (Zirkel et al., 2015). This is of particular interest as studies asking people about their current experience can yield largely different findings to studies asking about more general characteristics (Goetz, Bieg, Lüdtke, Pekrun, & Hall, 2013; Robinson & Clore, 2002).

The few existing diary studies show that the typical stressors and resources, such as colleague support, student motivation, and student behavior, also function as uplifts and hassles on the day-to-day level (Bakker & Bal, 2010; Kitching et al., 2009; Simbula, 2010; Tadić, Bakker, & Oerlemans, 2013). Additionally, they indicate that there is a lot of variance in the daily uplifts and hassles experienced by one teacher. Nonetheless, the question of which psychological mechanisms lie behind the effects caused by hassles and uplifts remains open. Recently, the concept of basic psychological needs from self-determination theory (SDT; Ryan & Deci, 2000) was proposed as an answer to this question (e.g., Bartholomew, Ntoumanis, Cuevas, & Lonsdale, 2014).

1.4. Basic need satisfaction as a mediator: theoretical foundations

The concept of basic psychological needs—the needs for autonomy, competence, and relatedness—is central to SDT, an organismic metatheory on human motivation and personality (Ryan & Deci, 2000). The theory implies that basic need satisfaction has a mediating role (see Fig. 1, Hypothesis 2). On the one hand, SDT proposes that basic need satisfaction not only fosters human motivation and personality development, but is also vital for well-being. A vast body of research underpins this assumption (Milyavskaya & Koestner, 2011; Van den Broeck, Vansteenkiste, De Witte, & Lens, 2008; for an overview, see also Ryan & Deci, 2000). On the other hand, SDT states that basic need satisfaction largely

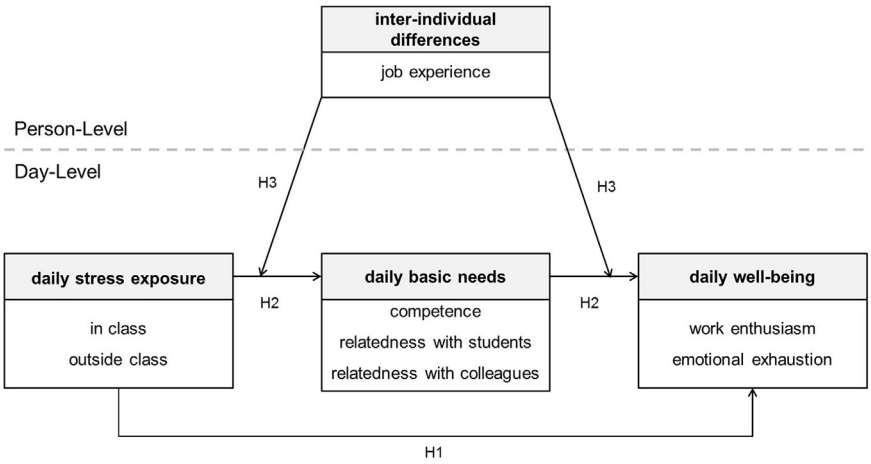

Fig. 1. Heuristic working model to illustrate our hypotheses (H1-H3) regarding the daily within-subject processes that affect teachers' daily well-being (Day-Level) and the inter-individual differences that moderate these associations (Person-Level). H1: Association between stress exposure and well-being, H2: Mediation via basic psychological needs, H3: Moderation by job experience.

depends on a person's social context (Ryan & Deci, 2000). The need for autonomy is satisfied when one is able to determine one's actions, whereas the need for competence is fulfilled when one feels able to apply or develop one's abilities and to achieve desired goals. Finally, the need for relatedness is satisfied when one can establish close relationships with others and feels mutual respect.

In the following, we examine the mediating role of the needs for competence and relatedness. We did not further consider the need for autonomy as the main conditions affecting teachers' autonomy (e.g., the freedom to determine teaching methods or goals) could be assumed to be rather stable across single days (De Neve, Devos, & Tuytens, 2015). In contrast, common daily hassles and uplifts most likely account for daily changes in feelings of competence and relatedness. For instance, disrespectful student behavior could be interpreted as a lack of classroom management skills or as personal disliking, and a chat with colleagues could increase feelings of relatedness with them. This indicates that distinguishing between two sources of relatedness might be beneficial when investigating teachers: relatedness with students and relatedness with colleagues (Klassen, Perry, & Frenzel, 2012). Teachers' need for relatedness with students has mostly been neglected in research so far, but may be of great importance for their well-being (Spilt, Koomen, & Thijs, 2011). After all, wanting to work with young people is one of the main reasons for choosing teaching as a career (Watt & Richardson, 2007), and building good interpersonal relationships with students is a central goal of teachers (Butler, 2012).

1.5. Basic need satisfaction as a mediator: empirical findings

Few studies have investigated basic need satisfaction as a mediator between teachers' stress exposure and well-being. Boudrias et al. (2014) found overall basic need satisfaction to mediate the relationship between job demands and social-organizational resources on the one hand and psychological well-being at work on the other hand. However, the unique contributions of each psychological need were not investigated. Fernet, Austin, Trépanier, and Dussault (2013) demonstrated that such an investigation yields interesting information. In their study, feelings of relatedness mediated the association between social support and burnout symptoms. In contrast, the need for competence explained the link between role ambiguity and job control with burnout symptoms. Similarly, Bartholomew et al. (2014) showed that the needs for competence and relatedness partially mediated the relationship between teachers' job pressure and burnout. Expanding on these studies, Klassen et al. (2012) demonstrated the advantage of investigating the need for relatedness in a more differentiated manner, and of separating the need for relatedness with students from the need for relatedness with colleagues. They found the needs for relatedness with students and for competence to predict teachers' work engagement, anger, and enjoyment, whereas the need for relatedness with colleagues was not or was only slightly associated with these variables. However, these studies only investigated a limited set of stressors and resources, they were cross-sectional in nature, and intra-individual dynamics were not examined. In order to understand intra-individual changes and processes, a daily perspective is necessary (Bolger & Laurenceau, 2013; Zirkel et al., 2015).

1.6. Present study

The present study aimed to examine whether basic need satisfaction explains the link between work-related stress exposure and teachers' occupational well-being. More precisely, we investigated stress exposure in class and outside class as predictors; the basic needs for relatedness with students, relatedness with colleagues, and competence as mediators; and work enthusiasm and emotional exhaustion as outcomes (see Fig. 1). We focused on intra-individual processes only instead of investigating inter-individual differences in change over time. Our study adds to the research field in two ways: First, the use of diary methodology facilitates conclusions about the daily processes that contribute to changes in teachers' occupational well-being, is close to teachers' everyday experience, and reduces retrospective bias. Second, our findings provide an understanding of the psychological mechanisms that link stress exposure and well-being. In particular, separating the need for relatedness into two components—relatedness with students and relatedness with colleagues—clarifies our understanding of teachers' basic needs and how they relate to teachers' well-being.

Our first research question addressed the association between stress exposure and occupational well-being on the day-to-day level. Based on theoretical models (Almeida, 2005; Demerouti et al., 2001), we expected to find a positive relationship between daily stress exposure in class and outside class and emotional exhaustion on the one hand, and a negative relationship with daily work enthusiasm on the other hand (Hypothesis 1). As teaching is at the core of this profession, we hypothesized to find particularly

close connections between stress exposure in class and work enthusiasm and emotional exhaustion. Our second research question asked whether the basic psychological needs for relatedness with students, relatedness with colleagues, and competence mediated this association. While the need for competence is generally seen as vital (Ryan & Deci, 2000), feeling related with students may be more important for teachers' well-being than feeling related with colleagues (Klassen et al., 2012; Spilt et al., 2011). After all, teachers spend far more working hours with students than with colleagues and building good teacher-student relationships is one of their main goals (Butler, 2012). Thus, we expected the needs for competence and for relatedness with students to mediate the relationship between daily stress exposure and well-being (Hypothesis 2). Finally, our third research question investigated possible inter-individual differences in the daily stress process. Based on Almeida's stress model (Almeida, 2005), we expected to find substantial inter-individual variations (Hypothesis 3). Drawing on Huberman (1989), we explored whether years of job experience could explain these variations in such a way that the associations between stress exposure, basic need satisfaction, and well-being would be exacerbated for the least experienced teachers.

2. Method

2.1. Procedure

In our diary study, teachers reported on daily stress exposure at work, basic need satisfaction, and occupational well-being at the end of each workday (between 6 p.m. and 12 a.m.) on 14 consecutive days. The teachers received a reminder via e-mail each day and the items were presented in the same order to all teachers on all days. We only analyzed the 10 workdays because the weekends were considered extraneous to our research questions. A two-week period was chosen in order to gain relatively broad insights into teachers' regular everyday lives while minimizing the burden for the participants. In addition, the teachers provided information on their demographic background in a pre-questionnaire. They were invited to participate via e-mail and received an individual code to access their personal online diary. The questionnaires were programmed and presented with the online platform Unipark by the software provider Globalpark and participants received a remuneration of up to €50 depending on the number of times they participated.

2.2. Sample

As our target population was beginning teachers, we contacted all teachers in one German federal state who had received their degree within the last four years ($N = 900$). 184 teachers participated. 32 teachers filled in the diary only once and were therefore excluded from the data analysis. This left 152 teachers for the final analysis. These teachers completed the diary on 7.4 days on average ($SD = 2.35$), providing a total of 1125 measurement points. 15% participated on two to four days, 24% on five to seven days, and 61% on eight to ten days.

As *t*-tests and Fisher's exact tests indicated, those excluded from the analysis did not differ from those included regarding years of job experience ($t\,(174) = 0.17$, $p = .86$), school form ($p = .63$), and trait-like emotional exhaustion[1] ($t\,(170) = 1.45$, $p = .15$), but male participants had a higher probability of being excluded ($p = .04$). In addition, the number of days participated was not or was only slightly correlated to overall stress exposure, basic need satisfaction, occupational well-being, and job experience ($.01 \leq |r| \leq .20$). The teachers in our study were 32.0 years old on average ($SD = 4.85$) and 80.3% of them were female. They had 2.3 years of job experience ($SD = 1.27$), 19.7% of them taught at primary schools, and 80.3% at secondary schools.

2.3. Instruments

2.3.1. Daily stress exposure

In an open format, teachers were asked to enter up to ten events that they had experienced at work each day ("Please write down the positive and negative events you experienced at work today!"). Based on a coding scheme, two independent raters coded the events into eight categories ($\kappa = .86$). The categories described teachers' major fields of activities and were derived from the standards for teacher education as defined by the Standing Conference of the Ministers of Education and Cultural Affairs of the States in the Federal Republic of Germany (KMK, 2004). The first category referred to events regarding instruction *in class* (e.g., classroom management, student motivation; 40.3% of all events). The remaining categories were combined to reduce the complexity of our model. They all described events *outside class* (59.7% of all events): preparation (15.9% of events outside class), interacting with students outside class (5.2%), counseling (6.6%), interacting with colleagues (38.5%), professional development (1.0%), organization (22.7%), and other (10.1%). After the categorization, several steps were taken to assess teachers' daily stress exposure. We drew on teachers' valence ratings of each event ("To what extent did you perceive the events as positive or negative?"), using a 5-point scale ranging from 1 = *very negative* to 5 = *very positive*. Subsequently, we summed up the number of uplifts (rating = 4 or 5, $N = 2495$) and hassles (rating = 1 or 2, $N = 1457$) that each teacher had experienced in class and outside class on a given day. Neutral experiences (rating = 3, $N = 470$, 10% of all events) were excluded. Finally, as we regard stress exposure as an imbalance between daily hassles and uplifts, we subtracted the amount of uplifts from the amount of hassles experienced in the respective category. Thus, positive values indicate that a teacher was exposed to more hassles than uplifts. A value of zero implies a balance between hassles and uplifts. This procedure explicitly considers the imbalance between hassles and uplifts while controlling for general inter-individual differences regarding the total amount of experiences reported. A similar approach was applied by Siegrist et al. (2004) and is also common in other related fields (e.g., Diener et al., 2010).

2.3.2. Daily work enthusiasm

We used two items ("I taught with great enthusiasm today.", "I really enjoyed my job today.") developed by Kunter et al. (2008) to measure work enthusiasm on a 4-point scale ranging from 1 = *strongly disagree* to 4 = *strongly agree*. As for all daily measures in this study, Cronbach's α was assessed separately for each day ($\alpha = 0.70$ - 0.85).

2.3.3. Daily emotional exhaustion

We assessed daily emotional exhaustion with a German version of the Maslach Burnout Inventory (MBI; Enzmann & Kleiber, 1989) on a 4-point scale (4 items, "I felt exhausted at work today.", "I felt like I am at the end of my rope today.", "I noticed how listless I was at work today.", "Today, I felt really exhausted at the end of my workday.", $\alpha = 0.73$ - 0.85) ranging from 1 = *strongly disagree* to 4 = *strongly agree*.

[1] The items are described in the instruments section and were slightly modified to assess trait-like emotional exhaustion in the pre-questionnaire.

2.3.4. Daily basic need satisfaction

On the basis of the Basic Need Satisfaction at Work Scale (Ryan & Deci, 2015), we constructed a German short scale to assess the daily fulfillment of teachers' needs for *relatedness with students* (2 items, "I got along well with my students today.", "My students and I understood each other well today.", $\alpha = 0.78$ - 0.94), for *relatedness with colleagues* (2 items, "I got along well with my colleagues today.", "My colleagues and I understood each other well today.", $\alpha = 0.86$ - 0.97), and for *competence* (2 items, "I really felt competent at work today.", "Altogether, I felt a sense of accomplishment from work today.", $\alpha = 0.65$ - 0.84) on a 4-point scale ranging from 1 = *strongly disagree* to 4 = *strongly agree*.

2.3.5. Demographic background

In a pre-questionnaire, participants provided information on their gender, the school form at which they were teaching, and their years of job experience. To facilitate interpretation, job experience was grand-mean centered ($M = 0$).

2.4. Data analysis

In our study, each participant filled in the diary on several days. Therefore, days (Level 1, $N = 1125$) were clustered within subjects (Level 2, $N = 152$) and the observations were not independent. If the hierarchical structure of the data is not taken into account, standard errors might be underestimated, increasing type I errors, and conclusions about the different levels and their interactions cannot be drawn (Snijders & Bosker, 2012). Thus, we used multilevel modeling.

To test our first and second research questions, we used within-subject mediation models with daily stress exposure as the predictor, daily basic need satisfaction as the mediator, and daily well-being as the outcome (see Fig. 1). We followed a procedure suggested by Bolger and Laurenceau (2013) to set up the models, using the software M*plus* 7 (Muthén & Muthén, 1998–2012). First, we group-mean centered all variables. This removed between-subject differences, allowing us to draw conclusions about mere within-subject processes. Second, we started with a mediation model on Level 1, in which the slopes were random and could thus vary between individuals. As suggested by Kenny, Korchmaros, and Bolger (2003), we included the covariation of paths when calculating the indirect effects, in order to take into account possible effects of co-moderation (i.e., the extent to which the path between *X* and *M* covaried with the path between *M* and *Y*). Third, we estimated the size of the mediation effects. In accordance with Wen and Fan (2015), we calculated the ratio of the indirect effect to the total effect (P_M).

To investigate our third research question, we first tested for significant slope variances. Following the recommendations in the methodological literature, we used likelihood ratio tests (Aguinis, Gottfredson, & Culpepper, 2013; Snijders & Bosker, 2012). We fixed one path after another and compared the fit of these models with the fully random model (i.e., variances and covariances of the slopes were freely estimated). To explain statistically significant slope variances, we tested for cross-level interactions by including the Level 2 variable *years of job experience* as a predictor of the Level 1 slopes (Aguinis et al., 2013). All analyses were performed using maximum likelihood estimation with robust standard errors.

Before testing our research questions, several steps were taken to establish the reliability and validity of our instruments in the context of multilevel modeling. We assessed the reliability of the daily measures in detecting within-subject changes (reliability of change, R_C; for a detailed description, see Cranford et al., 2006) with SPSS MIXED (Bolger & Laurenceau, 2013; Shrout & Lane, 2012). The size of R_C can be interpreted according to prevalent reliability coefficients (Cranford et al., 2006). R_C was satisfactory for all scales, ranging from $R_C = .71$ for the need for competence to $R_C = .90$ for the need for relatedness with colleagues (Table 1).

Additionally, we used a confirmatory multilevel factor analysis (Muthén, 1994) to confirm that the constructs of interest—the needs for competence, relatedness with students, relatedness with colleagues, work enthusiasm, and emotional exhaustion—were empirically distinguishable. On the within-subject level, we compared the fit of a one-factor model with a model with five intercorrelated factors ($.05 \leq |r| \leq .81$), where each item only loaded on the factor expected and the residuals were uncorrelated. In accordance with Hu and Bentler (1999), the one-factor model did not fit the data well ($\chi^2 = 1675.03$, $df = 66$, CFI = .52, RMSEA = .15), whereas the five-factor model showed an adequate fit ($\chi^2 = 166.63$, $df = 57$, CFI = .97, RMSEA = .04). Furthermore, the five-factor model had a statistically significant better fit than the one-factor model ($\chi^2_{diff} = 850.04$, $\Delta df = 9$, $p < .001$).

3. Results

3.1. Preliminary analysis

Table 1 shows the means for our predictor, mediator, and outcome variables before centering and Table 2 shows the correlations. On average, teachers experienced more uplifts than hassles each day, and this is reflected in negative values for stress exposure in class ($M = -0.49$) and outside class ($M = -0.59$). They reported a relatively high satisfaction of the basic psychological needs and relatively high work enthusiasm ($M = 3.09$), whereas emotional exhaustion was quite low ($M = 1.61$). Additionally, Table 1 shows the standard deviation on the within-subject level (SD_w) and the between-subject level (SD_b), as well as the intraclass correlation (ICC), which reflects the amount of variance in observations that is due to persons. This offers insights into the degree of intra-individual variation. For example, stress exposure in class (9%) and outside class (11%), and relatedness with students (16%) had the smallest amount of variance on the person level and the largest amount of variance on the day level. In contrast, the intraclass correlations for emotional exhaustion (31%) and relatedness with colleagues (35%) were nearly twice the size but still had the largest amount of variance on the day level.

Table 1
Descriptive results for stress exposure, the basic psychological needs, and occupational well-being.

	M	SD_w	SD_b	ICC	R_C
Stress exposure in class	−0.49	1.36	0.43	.09	
Uplifts in class	1.19	0.90	0.38	.15	
Hassles in class	0.70	0.76	0.28	.12	
Stress exposure outside class	−0.59	1.47	0.52	.11	
Uplifts outside class	1.41	1.01	0.52	.21	
Hassles outside class	0.82	0.88	0.38	.16	
Relatedness with students	3.42	0.59	0.25	.16	.87
Relatedness with colleagues	3.59	0.49	0.35	.35	.90
Competence	3.19	0.50	0.32	.28	.71
Work enthusiasm	3.09	0.61	0.34	.24	.78
Emotional exhaustion	1.61	0.51	0.34	.31	.75

Note. Stress exposure is the difference between hassles and uplifts; SD_w and SD_b refer to the standard deviations within and between subjects, respectively; the variances within and between subjects were used for the calculation of the intraclass correlation (ICC). R_c is a reliability coefficient for diary studies (Cranford et al., 2006) and assesses the scale's sensitivity to within-subject changes from day to day.

3.2. The relationship between daily stress exposure and teachers' well-being

Our first research question was whether daily stress exposure is related to occupational well-being. To answer this question, we set up our within-subject mediation model with stress exposure as the predictor and well-being as the outcome (see Fig. 2). The total effects attained from this model (Table 3) show that stress exposure in class was negatively and statistically significantly associated with work enthusiasm ($B = -0.21$, $p < .001$) and positively with emotional exhaustion ($B = 0.12$, $p < .001$). The same applies to stress exposure outside class and work enthusiasm ($B = -0.12$, $p < .001$) and emotional exhaustion ($B = 0.12$, $p < .001$). This means that teachers felt less work enthusiasm and more emotional exhaustion on days on which they experienced more stress in class and outside class than on their average day. The negative relationship between stress exposure in class and work enthusiasm was especially pronounced.

3.3. The basic psychological needs as a mediator

Our second research question was whether the basic needs for relatedness with students, relatedness with colleagues, and competence are mediators for the link between stress exposure and well-being. First, we investigated whether stress exposure was associated with basic need satisfaction. As Fig. 2 illustrates, daily stress exposure in class was linked to the needs for relatedness with students ($B = -0.18$, $p < .001$) and competence ($B = -0.14$, $p < .001$), whereas the link to relatedness with colleagues was rather small ($B = -0.04$, $p = .03$). Daily stress exposure outside class was negatively related to the needs for relatedness with students ($B = -0.06$, $p < .001$), relatedness with colleagues ($B = -0.08$, $p < .001$), and competence ($B = -0.09$, $p < .001$). This means that teachers felt more competent, more related with their students, and more related with their colleagues on days when they were exposed to less stress than on their average day.

Next, we examined basic need satisfaction as a mediator for the relation between stress exposure and work enthusiasm (Table 3). We found statistically significant specific indirect effects of the needs for relatedness with students (in class: $B = -0.06$, $p < .001$, outside class: $B = -0.02$, $p = .003$) and competence (in class: $B = -0.06$, $p < .001$, outside class: $B = -0.04$, $p < .001$). The needs for relatedness with students ($B = 0.30$, $p < .001$) and for competence ($B = 0.38$, $p < .001$) were also statistically significant predictors of work enthusiasm. As the direct effects show, the relationship of stress exposure in class ($B = -0.11$, $p < .001$) and outside class ($B = -0.08$, $p < .001$) with work enthusiasm was statistically significant, which indicates a partial mediation. Hence, our finding that teachers showed less work enthusiasm on days when they were exposed to more stress, can partly be explained by the fact that stress exposure is linked to feeling less related with students and less competent. Estimating the size of these effects, for stress exposure in class, we found $P_M = .29$ for both relatedness with students and competence, indicating that 29% of the total effect is explained by the indirect effect. For stress exposure outside class, we found $P_M = .17$ for relatedness with students and $P_M = .33$ for competence.

Turning to emotional exhaustion as an outcome, we found a statistically significant indirect effect of stress exposure in class ($B = 0.06$, $p < .001$) and outside class ($B = 0.03$, $p = .01$) on emotional exhaustion (Table 3). There was a statistically significant specific indirect effect of the need for competence (in class: $B = 0.05$, $p < .001$, outside class: $B = 0.03$, $p < .001$), which in turn predicted emotional exhaustion ($B = -0.34$, $p < .001$). Again, this was a partial mediation because the direct effects revealed statistically significant links between stress exposure in class ($B = 0.06$, $p = .004$) and outside class ($B = 0.08$, $p < .001$) with emotional exhaustion. Thus, our finding that teachers reported more emotional exhaustion on days when they were exposed to more stress can partly be explained by the fact that stress exposure is related to less satisfaction of the need for competence. We found $P_M = .42$ for stress exposure in class and $P_M = .25$ for stress exposure outside class. We modeled possible co-moderations for all of the indirect effects but they were not statistically significant and were only of modest size ($.00 \leq |r| \leq .40$). Moreover, to control for possible time effects across the two weeks, we ran two additional analyses, in which we included either a linear time trend or four dummy variables coding the day of the week. The results were almost identical.

3.4. Inter-individual differences regarding daily processes

Our third research question explored whether teachers differ in the daily processes that affect their well-being. To get an impression of the range of the slopes, we calculated prediction intervals (PI_{95}; Snijders & Bosker, 2012). These were based on the assumption that the slopes are normally distributed and, thus, that 95% of the slopes would lie within 1.96 standard deviations of the mean slope. Significant slope variance was found for the relations between stress exposure outside class and the need for competence ($PI_{95} = (-0.25; -0.04)$, $SD = 0.05$, $\chi^2_{diff} = 14.08$, $\Delta df = 5$, $p = .02$), work enthusiasm ($PI_{95} = (-0.22; 0.06)$, $SD = 0.07$, $\chi^2_{diff} = 16.08$, $\Delta df = 7$, $p = .02$), and emotional exhaustion ($PI_{95} = (-0.08; 0.25)$, $SD = 0.08$, $\chi^2_{diff} = 15.48$, $\Delta df = 7$, $p = .03$). Additionally, there was significant variance in the association between emotional exhaustion and relatedness with students ($PI_{95} = (-0.39; 0.29)$, $SD = 0.17$, $\chi^2_{diff} = 11.65$, $\Delta df = 5$, $p = .04$) and with colleagues ($PI_{95} = (-0.39;$

Table 2
Within-subject intercorrelations between stress exposure, the basic psychological needs, and occupational well-being.

	1	2	3	4	5	6	7	8	9	10	11
1 Stress exposure in class		**−.85**	**.78**	**−.08**	**.09**	−.00	**−.35**	**−.06**	**−.34**	**−.41**	**.24**
2 Uplifts in class			**−.35**	**.14**	**−.19**	−.02	**.27**	.05	**.28**	**.34**	**−.19**
3 Hassles in class				.00	−.06	−.06	**−.41**	−.06	**−.35**	**−.40**	**.24**
4 Stress exposure outside class					**−.80**	**.74**	**−.11**	**−.23**	**−.21**	**−.23**	**.30**
5 Uplifts outside class						**−.20**	**.13**	**.14**	**.19**	**.20**	**−.19**
6 Hassles outside class							−.04	**−.23**	**−.15**	**−.17**	**.31**
7 Relatedness with students								**.21**	**.62**	**.58**	**−.31**
8 Relatedness with colleagues									**.26**	**.13**	**−.13**
9 Competence										**.61**	**−.44**
10 Work enthusiasm											**−.50**
11 Emotional exhaustion											

Note. Stress exposure is the difference between hassles and uplifts; coefficients in bold are significant at $p < .05$.

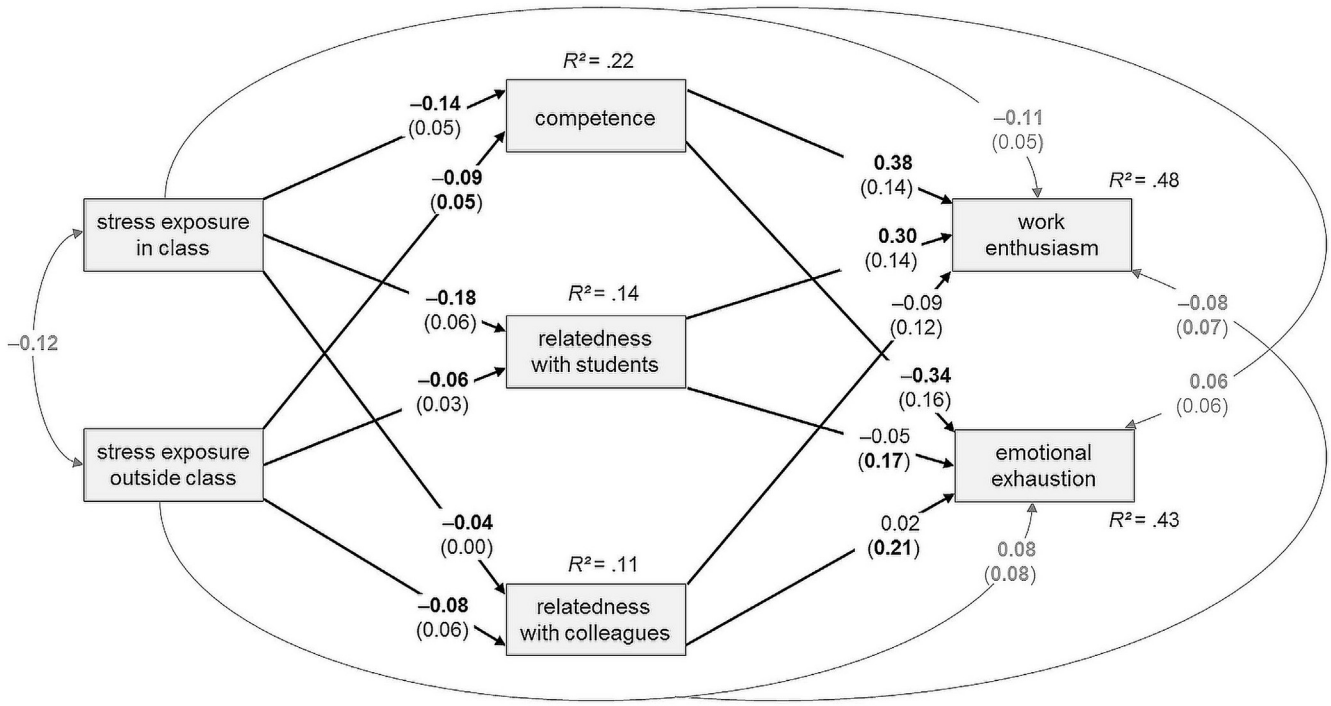

Fig. 2. Within-subject mediation model with stress exposure in class and outside class as predictors, the basic needs for relatedness with students, relatedness with colleagues, and competence as mediators, and work enthusiasm as well as emotional exhaustion as outcomes. The unstandardized multilevel regression coefficients are displayed and the corresponding standard deviations of the random slopes are in parentheses. For the sake of clarity, correlated residuals for the mediator variables and the outcome variables are not displayed. Paths regarding the indirect effects are highlighted. Coefficients in bold are significant at $p < 0.05$.

Table 3
Total effects, indirect effects, and direct effects for the within-subject mediation models.

	Enthusiasm		Exhaustion	
	B	*SE*	*B*	*SE*
Stress exposure in class				
Total effect	**−0.21**	0.02	**0.12**	0.02
Total indirect effect	**−0.11**	0.02	**0.06**	0.01
Specific indirect effects				
via students	**−0.06**	0.01	0.01	0.01
via colleagues	0.00	0.01	−0.00	0.01
via competence	**−0.06**	0.01	**0.05**	0.01
Direct effect	**−0.11**	0.02	**0.06**	0.02
Stress exposure outside class				
Total effect	**−0.12**	0.02	**0.12**	0.01
Total indirect effect	**−0.04**	0.02	**0.03**	0.01
Specific indirect effects				
via students	**−0.02**	0.01	−0.00	0.01
via colleagues	0.01	0.01	0.00	0.01
via competence	**−0.04**	0.01	**0.03**	0.01
Direct effect	**−0.08**	0.01	**0.08**	0.02
R^2	.48		.43	

Note. The unstandardized (*B*) coefficients are displayed. Coefficients in bold are significant at $p < .05$.

0.43), $SD = 0.21$, $\chi^2_{diff} = 19.46$, $\Delta df = 5$, $p = .002$). Next, we specified cross-level interactions to explore whether years of job experience could explain these inter-individual differences. Job experience was a statistically significant moderator of the relationship between emotional exhaustion and fulfillment of the need for relatedness with students ($B = 0.05$, $p = .05$, $R^2_{Slope} = 0.13$): The least experienced teachers reported more emotional exhaustion on days on which they did not feel related with their students (see Fig. 3). Job experience explained 13% of the slope variance, indicating a medium effect (Cohen, 1988).

4. Discussion

The main goal of the present diary study was to investigate whether satisfaction of the basic psychological needs (Ryan & Deci, 2000) can explain the link between teachers' daily stress exposure and their occupational well-being. We focused on the needs for competence, relatedness with students, and relatedness with colleagues to see how these needs contribute to occupational well-being as indicated by work enthusiasm and emotional exhaustion. Moreover, inter-individual differences regarding these daily processes were examined.

Our results show that daily stress exposure in class and outside class is negatively associated with teachers' well-being. This relationship could be explained by the fact that stress exposure inhibits satisfaction of the basic psychological needs, which—in turn—impairs well-being: Emotional exhaustion was higher when teachers felt less competent, and work enthusiasm was higher when teachers felt more related to their students and more competent. Relatedness with colleagues played a subordinate role. Additionally, teachers differed regarding these relations: The least experienced teachers appeared to be more prone to emotional exhaustion when their need for relatedness with students was not satisfied.

4.1. The relationship between daily stress exposure and teachers' well-being

Previous research has often linked teachers' stress exposure to occupational well-being (e.g., Hakanen et al., 2006; Klusmann et al., 2008a). While most of the studies so far have dealt with the question of which teachers have lower overall well-being, we

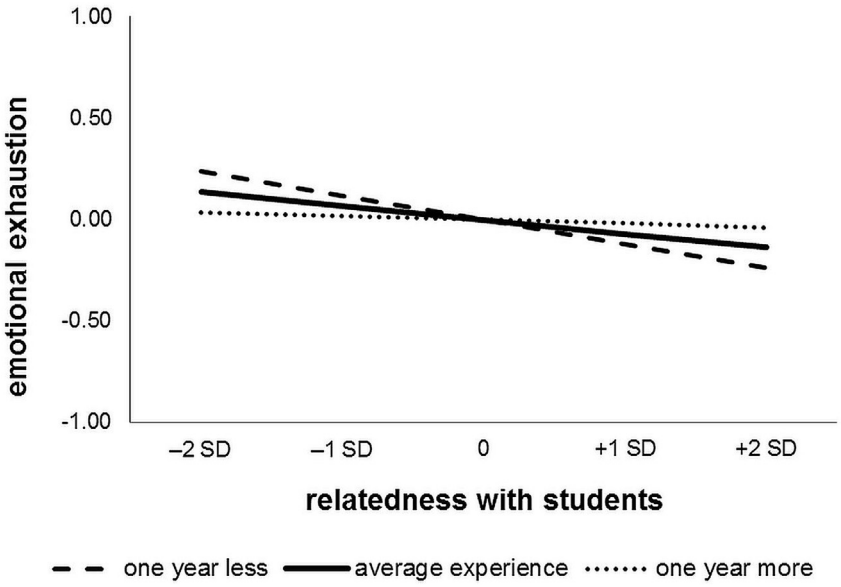

Fig. 3. Plot of the moderating effect of the Level 2 variable years of job experience on the relationship between the Level 1 variables emotional exhaustion and the basic need for relatedness with students.

considered daily intra-individual variations in teachers' stress exposure and well-being. Thereby, we found strong day-to-day fluctuations in teachers' daily experiences and also found that these fluctuations were immediately reflected in their well-being. Our results support our first assumption and show that, on days when teachers are exposed to more stress in class or outside class, they experience more emotional exhaustion and less work enthusiasm than on their average day. This is in accordance with Almeida's stress model (Almeida, 2005). In line with our assumptions, stress exposure in class and work enthusiasm were most closely associated. This is not surprising considering the fact that wanting to teach children is a core motivation to choose this profession (Watt & Richardson, 2007). Surprisingly, emotional exhaustion was linked to stress exposure in class and stress exposure outside class to a similar degree. This indicates that activities such as lesson preparation or interaction with colleagues are just as important in explaining teachers' emotional exhaustion as their daily experience in class.

4.2. The basic psychological needs as a mediator

The superordinate objective of the present study was to investigate the psychological mechanisms that explain the relationship between teachers' daily stress exposure and their occupational well-being. Drawing on self-determination theory (Ryan & Deci, 2000), we suggested that daily stress exposure might affect well-being because it impairs satisfaction of the basic psychological needs for competence, relatedness with students, and relatedness with colleagues. In particular, the needs for competence and relatedness with students were expected to be closely associated with teachers' well-being. Our results mostly support these assumptions and underpin previous studies that have suggested basic need satisfaction as a mediator (e.g., Bartholomew et al., 2014). The needs for competence and for relatedness with students partially mediated the relationship between stress exposure and work enthusiasm. Regarding emotional exhaustion, the need for competence turned out to be the only mediator. Consequently, the reason for why social interactions with students are rewarding and demanding at the same time is that they not only reconfirm or damage one's sense of professional competence, but that they also foster or diminish the feeling of being personally connected with one's students. However, more variables need to be taken into account in future research, e.g., considering the emotions that are evoked by stress exposure might add to a more complete picture (Chang, 2009). Interestingly, and in line with the job demands-resources model (Demerouti et al., 2001), the processes that influenced the positive and the negative dimension of occupational well-being differed.

Looking at the role of teachers' relatedness with colleagues, our findings may appear somewhat contradictory to previous findings about colleagues as a source of teacher stress and social support (Pomaki et al., 2010; Skaalvik & Skaalvik, 2011). However, in contrast to other studies, we did not investigate teacher-colleague interactions as a stressor or resource, but rather looked at the psychological mechanisms that might link this common stressor and resource to teachers' occupational well-being. Our findings indicate that feeling related to colleagues may not be an important mediator, particularly when compared to the needs for relatedness with students and competence. This is also consistent with the study of Klassen et al. (2012).

4.3. Inter-individual differences regarding daily processes

Based on the assumption that stress exposure affects people's well-being differently depending on certain person variables (Almeida, 2005), our third research question aimed to find out whether there were inter-individual differences regarding the relations in our model. Our hypothesis that there would be substantial inter-individual variation was confirmed. Job experience explained some of this variation: The least experienced teachers were particularly prone to feeling more emotional exhaustion when the need for relatedness with students was not satisfied.

4.4. Limitations

To the best of our knowledge, this is the first diary study to investigate the role that the basic needs for competence, relatedness with students, and relatedness with colleagues play as a

mediator between daily stress exposure and occupational well-being among teachers, as well as the inter-individual differences regarding the daily stress process. Nonetheless, there are some limitations that should be mentioned. First, our study focused on beginning teachers because the career entrance is often seen as a particularly important, but stressful phase in teachers' lives (Huberman, 1989). Due to this, our sample is not representative of the teacher population; the relationships between the variables under study may be different in other samples. In addition, there was some variation regarding the number of times each teacher participated and we cannot be sure that the data are missing completely at random. Second, we only used self-report measures, possibly evoking common method bias. The use of objective indicators of occupational well-being could provide a more detailed picture in future studies. Moreover, our instruments were quite brief in order to avoid fatigue among the participants. Consequently, one cannot rule out that the underlying constructs were not fully captured. Future research could avoid this shortcoming and gain deeper insights into the daily processes by additionally including open questions on basic need satisfaction and well-being on some days. Finally, we had no information about the teachers' general well-being at the beginning of the working day. In future research, this should be controlled for because teachers' daily stress exposure may not only be a predictor of well-being at the end of the day, but also a function of their general well-being at the start of the day.

4.5. Conclusions and implications

Our results indicate that work-related stress exposure is linked to beginning teachers' occupational well-being because it is associated with their need for competence and, most importantly, with their need for relatedness with students. This supports recent theoretical and empirical research that emphasizes teachers' need for interpersonal relationships with their students, which is a topic that has largely been neglected in research up until now. Our findings are of focal interest for teacher education and the design of interventions to improve (beginning) teachers' occupational well-being. For example, educators at the pre-service level could foster teachers' awareness of their basic psychological needs, which could help teachers to understand why certain events evoke certain reactions. Particularly, at the start of a career in teaching, critically reflecting on the need for relatedness with students may be useful. To facilitate stress prevention, it could also prove worthwhile to train teacher competencies that are conducive to the satisfaction of both the needs for relatedness with students and competence. More research is needed in this regard, but one promising approach could be the study of socio-emotional competencies. For instance, socially and emotionally competent teachers have high social awareness and are able to manage their emotions and those of others (Jennings & Greenberg, 2009). This enables them to build strong and supportive relationships, to regulate their emotions in challenging situations, and to set boundaries effectively. Multiple interventions are available to enhance these skills at the in-service level in order to promote positive teacher-student relationships and teachers' well-being (e.g., Brackett & Katulak, 2006; Roeser et al., 2013; Spilt, Koomen, Thijs, & van der Leij, 2012). These programs help teachers to become aware of and understand their emotional reactions so that reflection on their basic psychological needs could easily be integrated as a further valuable component.

References

Aguinis, H., Gottfredson, R. K., & Culpepper, S. A. (2013). Best-practice recommendations for estimating cross-level interaction effects using multilevel modeling. *Journal of Management, 39*, 1490–1528. http://dx.doi.org/10.1177/0149206313478188.

Almeida, D. M. (2005). Resilience and vulnerability to daily stressors assessed via diary methods. *Current Directions in Psychological Science, 14*, 64–68. http://dx.doi.org/10.1111/j.0963-7214.2005.00336.x.

Arens, A. K., & Morin, A. J. S. (2016). Relations between teachers' emotional exhaustion and students' educational outcomes. *Journal of Educational Psychology, 108*, 800–813. http://dx.doi.org/10.1037/edu0000105.

Bakker, A. B., & Bal, M. P. (2010). Weekly work engagement and performance: A study among starting teachers. *Journal of Occupational and Organizational Psychology, 83*, 189–206. http://dx.doi.org/10.1348/096317909X402596.

Bartholomew, K. J., Ntoumanis, N., Cuevas, R., & Lonsdale, C. (2014). Job pressure and ill-health in physical education teachers: The mediating role of psychological need thwarting. *Teaching and Teacher Education, 37*, 101–107. http://dx.doi.org/10.1016/j.tate.2013.10.006.

Bolger, N., & Laurenceau, J.-P. (2013). *Intensive longitudinal methods: An introduction to diary and experience sampling research*. New York, NY: Guilford Press.

Boudrias, J.-S., Gaudreau, P., Desrumaux, P., Leclerc, J.-S., Ntsame-Sima, M., Savoie, A., et al. (2014). Verification of a predictive model of psychological health at work in Canada and France. *Psychologica Belgica, 54*, 55–77. http://dx.doi.org/10.5334/pb.aa.

Brackett, M. A., & Katulak, M. A. (2006). *The emotionally intelligent teacher*. Ann Arbor, MI: Quest Education.

Butler, R. (2012). Striving to connect: Extending an achievement goal approach to teacher motivation to include relational goals for teaching. *Journal of Educational Psychology, 104*, 726–742. http://dx.doi.org/10.1037/a0028613.

Chang, M.-L. (2009). An appraisal perspective of teacher burnout: Examining the emotional work of teachers. *Educational Psychology Review, 21*, 193–218. http://dx.doi.org/10.1007/s10648-009-9106-y.

Chaplain, R. P. (2008). Stress and psychological distress among trainee secondary teachers in England. *Educational Psychology, 28*, 195–209. http://dx.doi.org/10.1080/01443410701491858.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale: Lawrence Erlbaum Associates.

Cranford, J. A., Shrout, P. E., Iida, M., Rafaeli, E., Yip, T., & Bolger, N. (2006). A procedure for evaluating sensitivity to within-person change: Can mood measures in diary studies detect change reliably? *Personality and Social Psychology Bulletin, 32*, 917–929. http://dx.doi.org/10.1177/0146167206287721.

De Neve, D., Devos, G., & Tuytens, M. (2015). The importance of job resources and self-efficacy for beginning teachers' professional learning in differentiated instruction. *Teaching and Teacher Education, 47*, 30–41. http://dx.doi.org/10.1016/j.tate.2014.12.003.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology, 86*, 499–512. http://dx.doi.org/10.1037/0021-9010.86.3.499.

Dicke, T., Parker, P. D., Holzberger, D., Kunina-Habenicht, O., Kunter, M., & Leutner, D. (2015). Beginning teachers' efficacy and emotional exhaustion: Latent changes, reciprocity, and the influence of professional knowledge. *Contemporary Educational Psychology, 41*, 62–72. http://dx.doi.org/10.1016/j.cedpsych.2014.11.003.

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D.-w., Oishi, S., et al. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social Indicators Research, 97*, 143–156. http://dx.doi.org/10.1007/s11205-009-9493-y.

van Droogenbroeck, F., Spruyt, B., & Vanroelen, C. (2014). Burnout among senior teachers: Investigating the role of workload and interpersonal relationships at work. *Teaching and Teacher Education, 43*, 99–109. http://dx.doi.org/10.1016/j.tate.2014.07.005.

Enzmann, D., & Kleiber, D. (1989). *MBI/EK – Maslach Burnout Inventory – deutsche Fassung [MBI/EK – Maslach Burnout Inventory – German version]*. Heidelberg: Asanger.

Fernet, C., Austin, S., Trépanier, S.-G., & Dussault, M. (2013). How do job characteristics contribute to burnout? Exploring the distinct mediating roles of perceived autonomy, competence, and relatedness. *European Journal of Work and Organizational Psychology, 22*, 123–137. http://dx.doi.org/10.1080/1359432X.2011.632161.

Fernet, C., Guay, F., Senécal, C., & Austin, S. (2012). Predicting intraindividual changes in teacher burnout: The role of perceived school environment and motivational factors. *Teaching and Teacher Education, 28*, 514–525. http://dx.doi.org/10.1016/j.tate.2011.11.013.

Gastaldi, F. G., Pasta, T., Longobardi, C., Prino, L. E., & Quaglia, R. (2014). Measuring the influence of stress and burnout in teacher-child relationship. *European Journal of Education and Psychology, 7*, 17–28. http://dx.doi.org/10.1989/ejep.v7il.149.

Goetz, T., Bieg, M., Lüdtke, O., Pekrun, R., & Hall, N. C. (2013). Do girls really experience more anxiety in mathematics? *Psychological Science, 24*, 2079–2087. http://dx.doi.org/10.1177/0956797613486989.

Gunthert, K. C., & Wenze, S. J. (2012). Daily diary methods. In M. R. Mehl, & T. S. Conner (Eds.), *Handbook of research methods for studying daily life*. New York, NY: Guilford Press.

Hakanen, J. J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *Journal of School Psychology, 43*, 495–513. http://dx.doi.org/10.1016/j.jsp.2005.11.001.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation*

Modeling: A Multidisciplinary Journal, 6, 1–55. http://dx.doi.org/10.1080/10705519909540118.
Huberman, M. (1989). The professional life cycle of teachers. *Teachers College Record, 91*, 31–57.
Jennings, P. A., & Greenberg, M. T. (2009). The prosocial classroom: Teacher social and emotional competence in relation to student and classroom outcomes. *Review of Educational Research, 79*, 491–525. http://dx.doi.org/10.3102/0034654308325693.
Jo, S. H. (2014). Teacher commitment: Exploring associations with relationships and emotions. *Teaching and Teacher Education, 43*, 120–130. http://dx.doi.org/10.1016/j.tate.2014.07.004.
de Jonge, J., Bosma, H., Peter, R., & Siegrist, J. (2000). Job strain, effort-reward imbalance and employee well-being: A large-scale cross-sectional study. *Social Science & Medicine, 50*, 1317–1327. http://dx.doi.org/10.1016/S0277-9536(99)00388-3.
Karasek, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly, 24*, 285–308. http://dx.doi.org/10.2307/2392498.
Keller, M. M., Goetz, T., Becker, E. S., Morger, V., & Hensley, L. (2014). Feeling and showing: A new conceptualization of dispositional teacher enthusiasm and its relation to students' interest. *Learning and Instruction, 33*, 29–38. http://dx.doi.org/10.1016/j.learninstruc.2014.03.001.
Kenny, D. A., Korchmaros, J. D., & Bolger, N. (2003). Lower level mediation in multilevel models. *Psychological Methods, 8*, 115–128. http://dx.doi.org/10.1037/1082-989X.8.2.115.
Kitching, K., Morgan, M., & O'Leary, M. (2009). It's the little things: Exploring the importance of commonplace events for early-career teachers' motivation. *Teachers and Teaching, 15*, 43–58. http://dx.doi.org/10.1080/13540600802661311.
Klassen, R. M., Perry, N. E., & Frenzel, A. C. (2012). Teachers' relatedness with students: An underemphasized component of teachers' basic psychological needs. *Journal of Educational Psychology, 104*, 150–165. http://dx.doi.org/10.1037/a0026253.
Klusmann, U., Kunter, M., Trautwein, U., Lüdtke, O., & Baumert, J. (2008a). Engagement and emotional exhaustion in teachers: Does the school context make a difference? *Applied Psychology, 57*, 127–151. http://dx.doi.org/10.1111/j.1464-0597.2008.00358.x.
Klusmann, U., Kunter, M., Trautwein, U., Lüdtke, O., & Baumert, J. (2008b). Teachers' occupational well-being and quality of instruction: The important role of self-regulatory patterns. *Journal of Educational Psychology, 100*, 702–715. http://dx.doi.org/10.1037/0022-0663.100.3.702.
Klusmann, U., Richter, D., & Lüdtke, O. (2016). Teachers' emotional exhaustion predicts students' achievement: Evidence from a large-scale assessment study. *Journal of Educational Psychology, 108*, 1193–1203. http://dx.doi.org/10.1037/edu0000125.
KMK. (2004). Standards für die Lehrerbildung: Bildungswissenschaften. Beschluss der Kultusministerkonferenz vom 16.12.2004 [Standards for teacher education: Educational sciences. Resolution of the Standing Conference of the Ministers of Education and Cultural Affairs of the States in the Federal Republic of Germany on 12/16/2004].
Kunter, M., Frenzel, A., Nagy, G., Baumert, J., & Pekrun, R. (2011). Teacher enthusiasm: Dimensionality and context specificity. *Contemporary Educational Psychology, 36*, 289–301. http://dx.doi.org/10.1016/j.cedpsych.2011.07.001.
Kunter, M., Klusmann, U., Baumert, J., Richter, D., Voss, T., & Hachfeld, A. (2013). Professional competence of teachers: Effects on instructional quality and student development. *Journal of Educational Psychology, 105*, 805–820. http://dx.doi.org/10.1037/a0032583.
Kunter, M., Tsai, Y.-M., Klusmann, U., Brunner, M., Krauss, S., & Baumert, J. (2008). Students' and mathematics teachers' perceptions of teacher enthusiasm and instruction. *Learning and Instruction, 18*, 468–482. http://dx.doi.org/10.1016/j.learninstruc.2008.06.008.
Kyriacou, C. (2001). Teacher stress: Directions for future research. *Educational Review, 53*, 27–35. http://dx.doi.org/10.1080/00131910120033628.
Lazarus, R. S. (1984). Puzzles in the study of daily hassles. *Journal of Behavioral Medicine, 7*, 375–389. http://dx.doi.org/10.1007/BF00845271.
Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York, NY: Springer Publishing Company.
Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology, 52*, 397–422. http://dx.doi.org/10.1146/annurev.psych.52.1.397.
Milyavskaya, M., & Koestner, R. (2011). Psychological needs, motivation, and well-being: A test of self-determination theory across multiple domains. *Personality and Individual Differences, 50*, 387–391. http://dx.doi.org/10.1016/j.paid.2010.10.029.
Muthén, B. O. (1994). Multilevel covariance structure analysis. *Sociological Methods & Research, 22*, 376–398. http://dx.doi.org/10.1177/0049124194022003006.
Muthén, L. K., & Muthén, B. O. (1998-2012). *Mplus user's guide: Seventh edition*. Los Angeles: Muthén & Muthén.
Pomaki, G., DeLongis, A., Frey, D., Short, K., & Woehrle, T. (2010). When the going gets tough: Direct, buffering and indirect effects of social support on turnover intention. *Teaching and Teacher Education, 26*, 1340–1346. http://dx.doi.org/10.1016/j.tate.2010.03.007.
Pyhältö, K., Pietarinen, J., & Salmela-Aro, K. (2011). Teacher–working-environment fit as a framework for burnout experienced by Finnish teachers. *Teaching and Teacher Education, 27*, 1101–1110. http://dx.doi.org/10.1016/j.tate.2011.05.006.
Robinson, M. D., & Clore, G. L. (2002). Belief and feeling: Evidence for an accessibility model of emotional self-report. *Psychological Bulletin, 128*, 934–960. http://dx.doi.org/10.1037//0033-2909.128.6.934.
Roeser, R. W., Schonert-Reichl, K. A., Jha, A., Cullen, M., Wallace, L., Wilensky, R, … Harrison, J. (2013). Mindfulness training and reductions in teacher stress and burnout: Results from two randomized, waitlist-control field trials. *Journal of Educational Psychology, 105*, 787–804. http://dx.doi.org/10.1037/a0032093.
Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*, 68–78. http://dx.doi.org/10.1037/0003-066X.55.1.68.
Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology, 52*, 141–166. http://dx.doi.org/10.1146/annurev.psych.52.1.141.
Ryan, R. M., & Deci, E. L. (2015). *Basic psychological needs scales: Basic need satisfaction at work. Unpublished instrument*. Retrieved from http://www.selfdeterminationtheory.org/basic-psychological-needs-scale/.
Shen, B., McCaughtry, N., Martin, J., Garn, A., Kulik, N., & Fahlman, M. (2015). The relationship between teacher burnout and student motivation. *The British Journal of Educational Psychology, 85*, 519–532. http://dx.doi.org/10.1111/bjep.12089.
Shrout, P. E., & Lane, S. P. (2012). Psychometrics. In M. R. Mehl, & T. S. Conner (Eds.), *Handbook of research methods for studying daily life*. New York. NY: Guilford Press.
Siegrist, J. (1996). Adverse health effects of high-effort/low-reward conditions. *Journal of Occupational Health Psychology, 1*, 27–41. http://dx.doi.org/10.1037/1076-8998.1.1.27.
Siegrist, J., Starke, D., Chandola, T., Godin, I., Marmot, M., Niedhammer, I., et al. (2004). The measurement of effort–reward imbalance at work: European comparisons. *Social Science & Medicine, 58*, 1483–1499. http://dx.doi.org/10.1016/S0277-9536(03)00351-4.
Simbula, S. (2010). Daily fluctuations in teachers' well-being: A diary study using the job demands-resources model. *Anxiety, Stress, and Coping, 23*, 563–584. http://dx.doi.org/10.1080/10615801003728273.
Skaalvik, E. M., & Skaalvik, S. (2010). Teacher self-efficacy and teacher burnout: A study of relations. *Teaching and Teacher Education, 26*, 1059–1069. http://dx.doi.org/10.1016/j.tate.2009.11.001.
Skaalvik, E. M., & Skaalvik, S. (2011). Teacher job satisfaction and motivation to leave the teaching profession: Relations with school context, feeling of belonging, and emotional exhaustion. *Teaching and Teacher Education, 27*, 1029–1038. http://dx.doi.org/10.1016/j.tate.2011.04.001.
Smith, T. M., & Ingersoll, R. M. (2004). What are the effects of induction and mentoring on beginning teacher turnover? *American Educational Research Journal, 41*, 681–714. http://dx.doi.org/10.3102/00028312041003681.
Snijders, T., & Bosker, R. J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling* (2nd ed.). Los Angeles, CA: Sage.
Spilt, J. L., Koomen, H. M., & Thijs, J. T. (2011). Teacher wellbeing: The importance of teacher-student relationships. *Educational Psychology Review, 23*, 457–477. http://dx.doi.org/10.1007/s10648-011-9170-y.
Spilt, J. L., Koomen, H. M., Thijs, J. T., & van der Leij, A. (2012). Supporting teachers' relationships with disruptive children: The potential of relationship-focused reflection. *Attachment & Human Development, 14*, 305–318. http://dx.doi.org/10.1080/14616734.2012.672286.
Tadić, M., Bakker, A. B., & Oerlemans, W. G. (2013). Work happiness among teachers: A day reconstruction study on the role of self-concordance. *Journal of School Psychology, 51*, 735–750. http://dx.doi.org/10.1016/j.jsp.2013.07.002.
Van den Broeck, A., Vansteenkiste, M., De Witte, H., & Lens, W. (2008). Explaining the relationships between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work & Stress, 22*, 277–294. http://dx.doi.org/10.1080/02678370802393672.
Veldman, I., van Tartwijk, J., Brekelmans, M., & Wubbels, T. (2013). Job satisfaction and teacher-student relationships across the teaching career: Four case studies. *Teaching and Teacher Education, 32*, 55–65. http://dx.doi.org/10.1016/j.tate.2013.01.005.
Watt, H. M., & Richardson, P. W. (2007). Motivational factors influencing teaching as a career choice: Development and validation of the FIT-Choice Scale. *The Journal of Experimental Education, 75*, 167–202. http://dx.doi.org/10.3200/JEXE.75.3.167-202.
Wen, Z., & Fan, X. (2015). Monotonicity of effect sizes: Questioning kappa-squared as mediation effect size measure. *Psychological Methods, 20*, 193–203. http://dx.doi.org/10.1037/met0000029.
Zirkel, S., Garcia, J. A., & Murphy, M. C. (2015). Experience-sampling research methods and their potential for education research. *Educational Researcher, 44*, 7–16. http://dx.doi.org/10.3102/0013189X14566879.