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## Teachers' classroom management self-efficacy, perceived classroom management and teaching contexts from beginning until mid-career



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Rebecca Lazarides<sup>a,\*</sup>, Helen M.G. Watt<sup>b,\*\*</sup>, Paul W. Richardson<sup>c</sup>

<sup>a</sup> Department of Education, Faculty of Humanities, Universität Potsdam, Karl-Liebknecht Straße 24-25, 14467, Potsdam-Golm, Germany
<sup>b</sup> School of Education and Social Work, Faculty of Arts and Social Sciences, The University of Sydney, NSW, 2006, Australia

<sup>c</sup> Faculty of Education, Monash University, Clayton Campus, Melbourne, VIC, 3800, Australia

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#### ABSTRACT

Teacher self-efficacy for classroom management is an important component of teachers' identity with implications for their teaching quality. Theoretically, it has been described that contextual variables play an important role for self-efficacy development and its consequences. However, little is known about the interrelationships of job resources and demands with teacher self-efficacy, and consequences for teachers' professional behaviors. We extend teacher self-efficacy research by drawing on the Job Demands-Resources model in examining contextual influences on developmental dynamics between classroom management self-efficacy and teacher-reported classroom management, from prior to qualifying as a teacher until mid-career. Participants were 395 primary and secondary Australian school teachers. Longitudinal structural equation models showed teachers' classroom management self-efficacy and mid-career, the positive relationship between self-efficacy and classroom management was moderated by early career excessive demands. Implications are outlined for teacher education and school administration.

## 1. Introduction

Effective classroom management is an important concern for beginning teachers (Dicke, Elling, Schmeck, & Leutner, 2015) and highly important for teachers' wellbeing (Sutton, Mudrey-Camino, & Knight, 2009), as well as their students' academic success (Emmer & Evertson, 1994; Evertson & Weinstein, 2013). Teachers' self-efficacy for classroom management is regarded as a central facet of teachers' professional competence (Kunter & Baumert, 2006) and key predictor of effective classroom management strategies (Brouwers & Tomic, 1999; Dicke et al., 2014; Lazarides, Buchholz, & Rubach, 2018; Zee & Koomen, 2016). Yet, although in their integrated model of teacher selfefficacy Tschannen-Moran, Hoy, and Hoy (1998) describe self-efficacy as context specific, little is known about how classroom management self-efficacy and classroom management behaviors are shaped by jobrelated contextual resources and demands. To effectively support teachers' self-efficacy and professional behaviors, it is important to understand the role of contextual school characteristics in their self-efficacy development. As well, the directional relationship between selfefficacy and teaching behaviors is currently under debate (Holzberger, Philipp, & Kunter, 2013; Praetorius et al., 2017), and the role of contextual resources and demands in these interrelationships has not been explored.

We address these research gaps by examining longitudinal interrelationships between teachers' self-efficacy for classroom management, self-reported school demands/resources and classroom management strategies, across three timepoints from teacher education until mid-career. We draw upon theoretical assumptions of Self-Efficacy Theory (Bandura, 1997) and the Job Demands-Resources Model (JDR; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001). The JDR model describes interrelationships between job resources, job demands and individual wellbeing, proposing that job demands lead to maladaptive coping, whereas job resources foster the use of adaptive strategies leading to higher wellbeing. We apply this model to the school context in which teachers work, with differential work demands and supporting infrastructure such as personnel, school leadership and facilities. We propose that teachers' perceived school demands and resources will affect how they deploy personal resources in the form of self-efficacy for classroom management, for the establishment of their reported classroom management strategies.

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<sup>\*</sup> Corresponding author.

<sup>\*\*</sup> Corresponding author.

E-mail addresses: rebecca.lazarides@uni-potsdam.de (R. Lazarides), helen.watt@sydney.edu.au (H.M.G. Watt), paul.richardson@monash.edu (P.W. Richardson).

The contribution of our study to current research on learning and instruction is threefold. We begin by examining reciprocal relationships between teachers' classroom management self-efficacy and teacher-reported classroom management across time, extending previous studies that investigated these relationships using global measures of self-efficacy across a shorter time period (Holzberger et al., 2013; Praetorius et al., 2017) rather than self-efficacy for the specific domain of classroom management. We further extend knowledge by examining stability and change in teachers' self-efficacy for classroom management over a longer time period mapped to teachers' career development from initial qualification until mid-career. Finally, we contribute to theory development by examining how contextual (teacher-perceived schoolrelated resources/demands) and personal (self-efficacy) factors interact to predict teacher-reported classroom management strategies.

## 1.1. Relationships among classroom management self-efficacy and classroom management

Classroom management self-efficacy has been defined as teachers' judgments of their capability to successfully perform classroom management tasks in the face of difficulties, for example, by interacting with individuals and groups, setting classroom guidelines, expectations and rules, and controlling disruptive behavior (Pfitzner-Eden, Thiel, & Horsley, 2015; Tschannen-Moran & Woolfolk Hoy, 2001). Empirical studies show that teachers who feel confident in their abilities to manage classrooms report fewer classroom disturbances (Brouwers & Tomic, 1999; Dicke et al., 2014). Little is known, however, about how teachers' self-efficacy for classroom management, and those teaching behaviors involved in effective classroom management, interrelate across time. The few existing longitudinal studies have tended to focus on teacher self-efficacy as a global measure (e.g., Holzberger et al., 2013; Praetorius et al., 2017) and not shown substantial effects of teacher self-efficacy on student-perceived teaching behaviors, but significant and positive effects on teacher-reported learning support (Holzberger et al., 2013). Other empirical work that focused on teachers' self-efficacy for classroom management also showed substantial longitudinal relationships to teacher-reported classroom management behavior (Dicke et al., 2014).

As self-efficacy has been described as domain-specific (Bandura, 1997; Pajares, 1996), we propose that aligning the facet of self-efficacy to the examined teaching behavior may be necessary to discern their mutual development in more precise investigations. Referring to classroom management as an umbrella term for an array of teaching strategies that enhance effective time use in class such as rule clarity (Emmer & Evertson, 1994), establishment of effective learning routines (Kounin, 1970) and effective behavior management (Emmer & Stough, 2001), in this study we represented both positive and negative aspects by including two dimensions: namely, structure and negativity. Teaching structure refers to classroom rule clarity and establishment of learning routines (see Kunter, Baumert, & Köller, 2007). Teaching negativity refers to the teacher's negatively controlling language and behaviors (e.g., negative feedback reactions) and problematic interactions with students (e.g., unfair treatment; Watt & Richardson, 2007). Negative teaching behaviors such as negative reactions to students' failure are an indicator for an ineffective behavior management of students and an important component of teachers' classroom management (Wubbels et al., 2014). When focusing on teacher reports of such behaviors, we interpret teacher-reported behaviors as teachers' evaluations of their own actions.

Researchers have typically assumed that self-efficacy affects classroom behaviors and student outcomes rather than the other way around, although empirical studies have mostly been cross-sectional (e.g., Burić & Kim, 2020; Egyed & Short, 2006; Skaalvik & Skaalvik, 2018). The longitudinal studies that exist have focused on relatively short timeframes, such as during one school year (Holzberger et al., 2013), or 18 months (Praetorius et al., 2017). Based on the theoretical proposition that mastery experiences constitute the major source of selfefficacy (Bandura, 1997), Holzberger et al. (2013) were first to examine reciprocal relationships between teachers' general self-efficacy and teaching behaviors as perceived by teachers and their students. The authors found that teacher-reported classroom management predicted subsequent teaching self-efficacy over the course of one school year and that teachers' self-efficacy related only to the subsequent *teacher-reported* behavior of learning support. Analyzing relationships between teachers' general self-efficacy and student-reported teaching behaviors spanning three timepoints (after 12 months, and a further 6 months), **Praetorius et al. (2017)** could not discern significant longitudinal relationships between teachers' general self-efficacy and student-reported classroom management in either direction.

Taken together, whereas empirical evidence for relationships between teacher self-efficacy and student-perceived teaching behaviors is scarce, teachers' self-efficacy seems to be related to their own subsequent perceptions of teaching behavior (classroom management: Dicke et al., 2014; learning support: Holzberger et al., 2013). These effects cannot only be explained by common-method bias because teacher self-efficacy related to some and not to all teacher-reported behaviors (Holzberger et al., 2013). In this long-term longitudinal study, we expected to identify significant effects of teacher self-efficacy for classroom management on subsequent teacher-reported classroom management behaviors.

### 1.2. Development of teachers' self-efficacy

Social-cognitive theory (Bandura, 1997) proposes that self-efficacy is rather stable once established. This implies that early career teaching may be the time during which teachers' self-efficacies are developing and therefore most malleable. In a study from the United States, preservice teachers' self-efficacy was found to increase during teacher education, but subsequently decline during their initial year teaching (Woolfolk Hoy & Spero, 2005). In a sample of German in-service teachers, teaching experience was found to be negatively associated with teachers' general and teaching-specific self-efficacies indicating that more experienced teachers felt less efficacious (Lauermann & König, 2016). In the OECD 2019 Teaching and Learning International Survey (TALIS) that asked teachers about working environments in their schools, findings across 26 countries showed that more teaching experience related to higher self-efficacy (Schleicher, 2018), including in the Australian TALIS sample (Freeman, O'Malley, & Eveleigh, 2014). In relation to self-efficacy for classroom management, U.S. teachers who had up to five years' experience reported lower levels than more experienced teachers (10+ years; Wolters & Daugherty, 2007). Other studies also found that more experience related to higher self-efficacy for classroom management (secondary teachers in The Netherlands: Brouwers & Tomic, 2000; teachers in Western Canada: Klassen & Chiu, 2010). Taken together, self-efficacy for classroom management may be vulnerable when beginning in the profession and improve as teachers accumulate mastery experiences, the strongest source of self-efficacy according to Bandura's social-cognitive theory. In this study, we accordingly expected that teachers' self-efficacy for classroom management would increase from the end of teacher education until their midcareer.

## 1.3. The role of perceived contextual resources and demands

Previous studies of teachers' self-efficacy development have insufficiently taken account of the school environments in which teachers work. Teachers are likely to feel more or less efficacious contingent on the resources and constraints of the specific school setting in which they teach (Betoret, 2006; De Neve, Devos, & Tuytens, 2015; Hakanen, Bakker, & Schaufeli, 2006). These interrelationships may differ across different points of a teacher's career, given that experienced teachers have an accumulation of mastery experiences to draw upon, whereas early career teachers may depend more upon contextual resources such as the quality of the school climate, colleagues and mentors, and be more adversely affected by excessive demands. Concordantly, crosssectional data show stronger associations between contextual resources and self-efficacy for novice than experienced teachers (Tschannen-Moran & Woolfolk Hoy, 2007). Studies that addressed the role of resources and demands among teachers in the school context (e.g., Betoret, 2006; Schwarzer & Hallum, 2008; Tschannen-Moran & Woolfolk Hoy, 2007) often refer to the framework of self-efficacy theory (Bandura, 1997) in which it is assumed that teachers' self-efficacy beliefs are informed by the evaluation of their own teaching competences and by the requirements of the teaching task, which also include available job resources or demands (Tschannen-Moran & Woolfolk Hoy, 2007).

Although self-efficacy theory (Bandura, 1997) provides a theoretical framework that allows investigation of the role of personal and contextual resources and demands for the development of teachers' selfefficacy, the theory only partially provides explanations about the interactions between job resources or demands with the personal resource of self-efficacy, and consequences for professional behaviors. Combining self-efficacy theory with other theoretical frameworks can enrich a systematic examination of the role that personal and job-related resources and demands play for teaching behaviors. The Job Demands-Resources model (JDR; Demerouti et al., 2001) complements self-efficacy theory (Bandura, 1997) when investigating interrelationships between personal resources (teachers' self-efficacy), external resources and demands, and teaching behaviors. The JDR model proposes that personal and contextual resources in the workplace can 'buffer' negative effects of contextual demands, and, that demands can undermine the benefits of resources (Demerouti et al., 2001, p. 502). According to the JDR model, contextual and personal resources promote work engagement and wellbeing in a 'motivational process'; whereas the 'energetic process' refers to contextual demands leading to burnout and illbeing (Hakanen et al., 2006).

Job demands are defined as the physical, psychological, social or organizational factors that require sustained effort, and psychological or physiological costs. A typically examined demand has been quantitative work overload (Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007). Job resources are defined as factors which reduce job demands and their associated costs; are functional towards the achievement of work goals; or stimulate growth, learning and development (Bakker & Demerouti, 2007). Self-efficacy is considered a *personal resource* that can mediate and moderate the effects of contextual resources/demands (Xanthopoulou et al., 2007).

Although the JDR model has its key outcomes as employees' engagement versus burnout, recent research has applied the JDR model to questions concerned with professional behaviors in the teaching profession, for example, by investigating the interplay of personal resources (self-efficacy) with external resources and demands and their relationships to teaching strategies (De Neve et al., 2015) or by examining whether personal resources (teacher self-efficacy) moderate the relationship between imposed pressure and teacher stress (Putwain & von der Embse, 2019).

In this study, we operationalized contextual demands in the form of experienced excessive demands (Hart, Wearing, Conn, Carter, & Dingle, 2000), akin to quantitative work overload. In the category of job resources we included indicators of perceived school advantage (school resources, student achievement levels and socioeconomic status), and social support in the form of mentoring during early career. We decided to focus on these external resources because the literature on teacher self-efficacy has shown that school facilities and materials, and colleagues' support, were the contextual variables most strongly related to teachers' self-efficacy (Tschannen-Moran & Woolfolk Hoy, 2007). Social support in the form of early career mentoring has been shown to yield positive effects on teachers' reported classroom management (Malderez, Hobson, Tracey, & Kerr, 2007) and self-efficacy (Schleicher, 2018). In

terms of student achievement levels, the TALIS Australian data (Freeman et al., 2014) showed that having more than 10 percent of academically gifted students in a class associated with higher teacher self-efficacy. We added socioeconomic status of the students as an external resource as previous research identified percentage of lower, middle and upper-class students as important for teachers' perceived classroom management (Safran, 1990).

Summarizing these theoretical and empirical findings, we draw on the tenets of the JDR model in this study because it enhances our understanding of the interaction between personal resources, contextual job demands and resources, and consequences for teaching behaviors. Perceived job demands should undermine, and job resources boost, the potential stimulating effect of self-efficacy on teacher-reported positive classroom management behavior (vice versa for negative behavior).

## 1.4. The present study

We extend current research by examining the development of classroom management self-efficacy and teacher-reported classroom management (structure and negativity) as well as their interrelationships, across a timespan from directly prior to qualifying as a teacher until mid-career, taking into account potential reciprocal effects. We investigated whether teacher-perceived contextual resources (school advantage, early career mentoring) and experienced excessive demands (a) directly relate to teachers' classroom management self-efficacy and teacher-reported classroom management strategies; (b) moderate the stability of self-efficacy and teacher-reported classroom management; or (c) moderate the proposed longitudinal relationships between selfefficacy and classroom management strategies as reported by teachers. We believe it is important to measure self-efficacy prior to professional entry, because individuals enter workplaces already possessing personal resources (such as self-efficacy), and that different kinds of experienced school contexts would support or hinder the realization of teachers' selfefficacy development. To our knowledge, there is no other large-scale, long-term longitudinal study of a teacher cohort mapped to development in the profession until their mid-career.

Based on previous research (Brouwers & Tomic, 2000; Klassen & Chiu, 2010), we expected classroom management self-efficacy may be less stable during early career (Hypothesis 1). We expected that teachers' classroom management self-efficacy would be an important predictor of their reported classroom management due to enhanced feelings of control (Bandura, 1997), promoting positive and reducing negative classroom behaviors. More concretely, we expected positive effects of classroom management self-efficacy on teacher-reported structure, and negative effects on teacher-reported negativity (Hypothesis 2); and potential reciprocal relationships between these classroom management strategies and self-efficacy for classroom management (Hypothesis 3; based on Holzberger et al., 2013). We anticipated positive associations with perceived contextual resources, and negative associations with demands, for teachers' classroom management self-efficacy and reported behaviors (Hypothesis 4). Also, that experienced resources and demands may moderate stabilities of teachers' self-efficacies and reported classroom management across time as well as their interrelationships (Hypothesis 5). We propose that teachers' perceptions of excessive demands could stifle the otherwise positive effects of classroom management self-efficacy on teacher-reported classroom management behaviors, whereas resources may amplify its stimulating role. The hypothesized direct and indirect relationships are depicted in Fig. 1.

We included diverse domains of teaching subjects, and controlled for level of schooling (primary/secondary) as, particularly in secondary school, teachers face challenges such as declining student motivation (Watt, 2004) and high levels of exhaustion (Klusmann, Kunter, Trautwein, Lüdtke, & Baumert, 2008). Individual demographic factors such as gender were included, as some studies showed women report lower classroom management self-efficacy than men (Klassen & Chiu,



Fig. 1. Conceptual model for the hypothesized main effects.

Note. Months of teaching experience at waves 3 and 4 were additionally included as covariates. All variables were allowed to correlate within waves, but correlations are not depicted for reasons of clarity. Hypothesized moderated paths are not depicted.

2010), together with own social background (family income level), English language background and age.

#### 2. Method

#### 2.1. Participants and procedure

Participants were primary and secondary school teachers (N = 395; 56.50% secondary) in the continuing longitudinal Factors Influencing Teaching (FIT-)Choice project (www.fitchoice.org) that examines the development of beginning teachers' career motivations, antecedents and consequences, across different sociocultural settings. There were 172 primary school teachers (n = 151 classroom general teachers who teach multiple subjects to same classes of students; n = 21 subject specialist teachers who teach a same subject across multiple classes of students) and 223 secondary school teachers. As in the general teaching population (OECD, 2019), women were overrepresented (79.50%). In waves 1 and 2 paper surveys were administered by the second and third authors with the help of trained assistants and with University ethics approval, and took approximately 20 minutes to complete. Waves 3 and 4 data were collected using online surveys during each of early and mid-career when participants commenced their teaching careers at various schools.

The original sample was recruited in 2002/2003/2006 in four Australian universities, consisting at wave 1 of 1841 beginning teacher education students enrolled in primary (n = 805) and secondary (n = 1036) strands (also those enrolled in early childhood, n = 166, who were not included in our present study). At wave 1, all beginning teacher education students were provided with paper information and consent forms during their first weeks of a compulsory course. Those who agreed to participate completed the paper surveys during negotiated classtime, concerning their motivations for choosing to become a teacher (for details including response rates > 75% see Richardson & Watt, 2006).

Wave 2 paper surveys were administered to these recruited participants just prior to their degree completion during negotiated classtime. The timing for wave 2 differed depending on participants' degree enrollment: teaching qualifications ranged in length from 1 to 2 years versus 4–5 years at the different universities, for graduate-entry versus Bachelor enrollments. Overall, 1537 (83.49%) of primary and secondary participants had completed their teaching qualification. Of them, 863 responded at wave 2 (n = 373 out of 656 primary degree completions; n = 490 out of 881 secondary degree completions).

At wave 3, during early career, 734 of the participants who had qualified to teach primary or secondary education responded to online surveys (primary n = 289, secondary n = 445), 639 of whom were teaching and who completed measures of the present study (n = 263 in primary schools, n = 376 in secondary schools). Others had quit or never taught and were necessarily excluded. Conservative retention

rates for wave 3 teachers were calculated out of those who had completed their teaching qualification but not identified as quit or never taught at wave 3, thus 41.75% for primary teachers and 46.31% for secondary.

At wave 4 (mid-career), there were 254 primary and 308 secondary teacher participants (total of 562; an additional 22 primary and 50 secondary respondents at wave 4 were not teaching and not included in our study). We similarly conservatively calculated wave 4 retention out of those who had completed their teaching qualification but not identified as quit or never taught at either waves 3 or 4, thus 41.78% for primary teachers and 40.42% for secondary.

In a next step we excluded from the 639 participants who had been teaching at wave 3, any who were no longer teaching at wave 4 or absent. In addition, 27 participants were excluded who switched from primary to secondary teaching (or vice versa) between waves 3 to 4, given that school level was an examined covariate in our analyses. This selection process resulted in our sample total of 395 teachers, all of whom were present waves 1, 3 and 4, and the majority of whom (n = 294) participated at wave 2. Characteristics of our study sample were mainly similar to other initial participants who had qualified to teach but were either excluded or lost from our present study due to attrition (Appendix A). Missing value analyses showed that measured constructs were missing completely at random across waves 2, 3 and 4,  $\chi^2(N = 395) = 290.79$ , df = 278, p = .29.

Our final sample included 395 participants' data across waves 2–4 when self-efficacy was assessed. At wave 3 during early career participants had an average 3.08 years of teaching experience (SD = 1.95); at wave 4 they had an average 10.18 years of experience (SD = 2.65). Individual demographic characteristics were assessed at wave 1, when participants in the present study had ages between 17 and 58 years (M = 25.88, SD = 8.49) and the majority reported English as their home language (91.40%). At wave 3, secondary teachers reported which school subjects they taught (note that, because secondary teachers can teach multiple subjects, these numbers are not mutually exclusive). The highest frequencies were for English (28.70%/n = 64), followed by sciences (24.22%/n = 54), and mathematics (19.28%/n = 43).

#### 2.2. Measures

## 2.2.1. Self-efficacy for classroom management

Teacher self-efficacy for classroom management was assessed using adapted items from the Teachers' Sense of Efficacy Scale (Tschannen-Moran & Woolfolk Hoy, 2001). The introductory stem was "How certain are you that you can ...", responses were recorded on Likert-type scales that ranged from 1 (not at all) to 7 (extremely). The classroom management subscale included two identically worded items at each timepoint: "manage disobedient students?", and "establish a classroom management system with each group of students?" (see Appendix B). The Spearman Brown reliability coefficient, suited for assessing twoitem scales (Eisinga, Grotenhuis, & Pelzer, 2013), showed an acceptable reliability at all waves ( $\alpha s = 0.72$  at wave 2; 0.75 at wave 3; 0.66 at wave 4).

#### 2.2.2. Teacher-reported structure

Teacher-reported classroom management in the form of structure, was assessed using the Teacher Style Scale (Watt & Richardson, 2007; see also Spearman & Watt, 2013) with response scales ranging from 1 (not at all) to 7 (a lot). Three items assessed structure, identically worded across timepoints (see Appendix B). The introductory stem was "To what extent do students in your classes feel ...", followed by "they know what will happen if they break a class rule?". "they have an explicit set of class rules to follow?" and "there are clear expectations about student behavior?". The reliability was high at waves 3 and 4  $(\alpha s = 0.83, 0.82 \text{ respectively}).$ 

## 2.2.3. Teacher-reported negativity

Teacher-reported negativity was also assessed by items from the Teacher Style Scale (Watt & Richardson, 2007), ranging from 1 (not at all) to 7 (a lot), for four items (see Appendix B). The introductory stem was "To what extent do students in your classes feel ..." followed by "worried you might react negatively if they don't understand?", "feedback they get from you is sometimes too negative?", "you might react negatively towards their mistakes?" and "some students are treated better than others?". Reliability was acceptable at waves 3 and 4  $(\alpha s = 0.69, 0.68 \text{ respectively})$  and inverse correlations with structure confirmed these factors tapped positive and negative aspects of classroom management as intended (see Table 2).

### 2.2.4. Perceived school advantage

The perceived relative advantage of participants' schools was tapped at waves 3 and 4 with three items - item 1 referred to resources and facilities in the school, item 2 to socioeconomic status, and item 3 to student achievement level. The preceding stem stated "School Environment: Describe features of the school you are currently working in, by ticking one option for each question below". Responses were coded 1-5 for each of "Resources/Facilities": Very inadequate, Less than adequate, Adequate, More than adequate, Excellent; "Socioeconomic status": Low, Low-middle, Middle, Middle-high, High; and "Student achievement": Far below state average, Below state average, Generally state average, Above state average, Far above state average. The reliability of the scale was high at waves 3 and 4  $(\alpha s = 0.73, 0.75, respectively).$ 

## 2.2.5. Perceived early career mentoring

Early career experience of mentoring was assessed at wave 3 with

two items: "This school provides effective mentoring for beginning teachers" and "I personally experienced effective mentoring at this school". Teachers responded on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). The reliability of the scale was high  $(\alpha = 0.91).$ 

### 2.2.6. Perceived excessive demands

Perceived excessive demands were measured by three items from Hart et al. (2000) at waves 3 and 4: "Teachers are overloaded with work in this school", "There is too much expected of teachers in this school" and "There is constant pressure for teachers to keep working", rated from 1 (strongly disagree) to 5 (strongly agree). The reliability of the scale was high at waves 3 and 4 ( $\alpha s = 0.84, 0.85$ , respectively).

#### 2.2.7. Covariates

Individual demographic characteristics (teacher gender: 1 = male, 2 = female; age; English language background; income background) assessed at wave 1, school level taught (primary/secondary) and months of teaching experience at waves 3 and 4 were included as covariates.

## 2.3. Analyses

Metric measurement invariance of the latent variables across time was tested using a stepwise procedure following Byrne (2004). In a first step, a measurement model with configural invariance was established including all latent constructs that were assessed at more than one timepoint (teacher-perceived school advantage, excessive demands, self-efficacy for classroom management, self-reported structure and negativity). Second, the factor loadings were set invariant across time. The measurement models fitted the data well and confirmed metric invariance over time, as constraining the factor loadings of the corresponding indicators to be equal did not lead to a significant decrease in the model fit (see Appendix C).

Keeping invariance restrictions in the model, longitudinal structural equation models tested the hypothesized relationships. Correlations were specified among all latent factors within the same measurement occasion, as well as the residual variances of same worded items across measurement occasions (Little, 2013). Hypothesized moderation effects of teaching experience, experienced resources and excessive demands were examined in separate models outlined in the Results. Mplus Version 8.3 was used for all analyses (Muthén & Muthén, 1998-2019), using maximum likelihood estimation with robust standard errors (MLR). Missing data were handled using full-information maximum likelihood estimation (FIML). Hu and Bentler's (1999) two-index strategy for determining fit integrated information from the comparative fit index (CFI) and standardized root mean square residual (SRMR);

Table 1

Descriptive statistics: Range of standardized factor loadings, means and standard deviations of the study variables across waves (N = 395).

W2	$\lambda$ minmax.	М	SD	W3	$\lambda$ minmax.	М	SD	W4	$\lambda$ minmax.	М	SD
Self W	/2 <sup>a</sup> .84–.88	5.37	1.10	Self W3 <sup>a</sup>	.87–.89	5.30	1.19	Self W4 <sup>a</sup>	.83–.86	5.33	1.12
				Struc W3 <sup>a</sup>	.7384	5.61	1.10	Struc W4 <sup>a</sup>	.7780	5.82	0.98
				Neg W3 <sup>a</sup>	.5164	2.25	0.86	Neg W4 <sup>a</sup>	.55–.67	2.27	0.93
				Demand W3 <sup>b</sup>	.7287	3.45	0.98	Demand W4 <sup>b</sup>	.7689	3.60	0.96
				Advan W3 <sup>b</sup>	.44–.86	3.06	0.84	Advan W4 <sup>b</sup>	.4785	3.21	0.90
				Ment W3 <sup>b</sup>	.88–.95	3.19	1.30				
				Months W3 $^{\circ}$	n.a. <sup>e</sup>	37.03	23.43	Months W4 <sup>d</sup>	n.a. <sup>e</sup>	123.70	31.75

Note. Self = Classroom management self-efficacy; Struc = Teacher-reported structure; Neg = Teacher-reported negativity; Demand = Experienced excessive demands; Advan = School advantage; Ment = Mentoring experience; Months = Months of teaching experience. W2 = Wave 2; W3 = Wave 3; W4 = Wave 4.

<sup>a</sup> Range: 1–7. <sup>b</sup> Range 1–5.

<sup>c</sup> Range: 1–109.

<sup>d</sup> Range: 13-240.

Indicates single-item measures.

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udy variables.

	1	2	e	4	2	9	7	ø	6	10	11	12	13	14	15	16	17	18
1) Women 2) Age	11																	
3) Income	$.10^{*}$	08																
4) Lang	.01	.04	07															
5) Secondary	22***	.16**	.06	.08														
6) Demand W3	09	.04	02	.05	.20***													
7) Demand W4	.03	02	06	.06	02	.37***												
8) Ment W3	.08	14*	.05	.05	09	19*	14											
9) Advan W3	06	60.	$.18^{**}$	01	.01	.04	.08	.02										
10) Advan W4	06	.03	.12	10	.05	.19***	.08	04	.72***									
11) Months W3	09	.14**	.05	.16**	.19***	$.20^{***}$	.06	.05	.14*	.08								
12) Months W4	11*	.16***	02	.10	.14**	.10	.12*	07	60.	.01	.45***							
13) Self W2	.02	05	.01	$.10^{*}$	12*	07	.05	.14	13	25***	.08	11.						
14) Self W3	01	05	.05	.05	07	04	02	.20***	.12	.06	.26***	.17**	.50***					
15) Self W4	.10	.01	.15*	.01	09	.02	.01	.13*	.05	.10	.12*	.11	.37***	.66***				
16) Struc W3	.14**	05	.01	.02	24*	09	01	.13	04	03	$.11^{*}$	$.11^{*}$	.27***	.73***	.51***			
17) Struc W4	.22***	.02	.08	.01	25*	02	.01	.12	.03	.01	.10	.04	.17*	.51***	.74***	.63***		
18) Neg W3	17**	05	01	.12	.15*	$.16^{*}$	.13	09	08	06	08	08	17*	42***	34***	41***	42***	
19) Neg W4	18**	01	05	.13	.14*	.06	.23**	11	05	09	07	07	10	28***	25**	32***	40***	.61***
Note. *p < .05; **	p < .01; *	**p < .001																

= English speaking; Secondary school teacher; Self = Classroom management self-efficacy; Struc = Teacher-reported structure; Neg = Teacher-reported negativity; Advan = School advantage; Lang

Demand = Experienced excessive demands; Ment = Mentoring experience; Months = Months of teaching experience. W2 = Wave 2; W3 = Wave 3; W4 = Wave 4.

models with CFI  $\geq$  0.95 and SRMR  $\leq$  0.09 are considered to have adequate fit. Additional indices to assess model fit were the root mean square error of approximation (RMSEA) < 0.06 and TLI close to 0.95.

## 3. Results

## 3.1. Measurement models and descriptive analyses

An initial CFA including all latent constructs and measurement invariance constraints showed acceptable fit:  $\chi^2 = 819.165$ , df = 534, CFI = 0.94, TLI = 0.93, RMSEA = 0.04, SRMR = 0.06. Descriptive statistics for all constructs included in analyses are reported in Table 1. To ensure that teacher self-efficacy for classroom management and teacher-reported structure at each of waves 3 and 4 formed distinct latent constructs we additionally tested two CFA models and compared their BIC values in line with recommendations of Nylund, Asparouhov, and Muthén (2007). Results showed better fit for the four-factor than a two-factor solution (where self-efficacy for classroom management and teacher-reported structure items indicated a single latent factor at each wave) indicating that the latent constructs were clearly separable (see Appendix D). To obtain latent correlations among all study variables, we subsequently added manifest variables to the CFA (teacher gender, age, income background, months teaching in early and mid-career, English language background, and primary/secondary teaching). Classroom management self-efficacy was rather stable across time (waves 2 to 3:  $\varphi = 0.50$ ; waves 3 to 4:  $\varphi = 0.66$ ), as were teacherreported behaviors of structure ( $\varphi = 0.63$ ) and negativity ( $\varphi = 0.61$ ) from early until mid-career. Although self-efficacy appeared less stable during early career, formal comparison of the two coefficients (Wald  $\chi^2(1) = 0.002, p = .965$ ) revealed they were not statistically different. counter to Hypothesis 1. Latent correlation coefficients are reported in Table 2.

Gender significantly associated with teacher-reported structure and negativity both in early and mid-career, with women reporting higher structure and lower negativity than men. Teaching experience in early career positively associated with classroom management self-efficacy in each of early and mid-career, and teacher-reported structure in early career. Mentoring experience in early career positively associated with classroom management self-efficacy in early and mid-career. Experienced excessive demands in early career related to greater negativity in early career; similarly for perceived excessive demands and negativity within mid-career. Secondary school teachers reported lower classroom management self-efficacy at the end of teacher education, experienced more excessive demands during early career, and reported lower structure and higher negativity in both early and mid-career. Higher levels of classroom management self-efficacy at the end of teacher education associated with lower reported negativity in early career, and higher structure in early and mid-career.

## 3.2. Relationships between classroom management self-efficacy, teacherreported classroom management behaviors, and contextual resources and demands

To examine the development of teachers' self-efficacy for classroom management and self-reported classroom management, as well as their interrelationships with perceived contextual resources and demands, we tested a cross-lagged panel model including covariates (gender, age, English language background, income background, school level, and length of teaching experience). The conceptual model of hypothesized relationships is depicted in Fig. 1. The longitudinal structural equation model showed good fit:  $\chi^2 = 910.95$ , df = 670, CFI = 0.95, TLI = 0.94, RMSEA = 0.03, SRMR = .05.<sup>1</sup> We report findings which

<sup>&</sup>lt;sup>1</sup>We also tested this model excluding resources and demands and the results were similar.

address each hypothesis in the text and in Fig. 2; all standardized regression coefficients are reported in Table 3. Correlated uniquenesses (between prediction errors) from the model are reported in Table 4.

Classroom management self-efficacy at wave 2 positively related to classroom management self-efficacy at wave 3 ( $\gamma = 0.51$ , SE = 0.07, p < .001), which in turn positively related to classroom management self-efficacy at wave 4 ( $\beta$  = 0.62, SE = 0.12, p < .001). To test whether self-efficacy for classroom management would be less stable during early career (Hypothesis 1), we examined whether length of teaching experience associated with self-efficacy at early career. We also examined whether teaching experience at each of early and mid-career moderated the stability of teachers' self-efficacy. We found that length of teaching experience in early career (wave 3) did not significantly moderate the stability of self-efficacy from waves 2 to 3 ( $\beta = 0.01$ , SE = 0.01, p = .82) or from waves 3 to 4 ( $\beta = 0.01, SE = 0.01$ , p = .38). Although stability was similar across waves and not moderated by teaching experience, the large time gap could be a reason for non-significant effects, or moderation by contextual factors that we did not examine.

In line with Hypothesis 2, classroom management self-efficacy at the end of teacher education (wave 2) positively related to teacherreported structure in early career and to lower negativity during early career (wave 3 structure:  $\gamma = 0.25$ , SE = 0.08, p = .001; negativity:  $\gamma = -0.19$ , SE = 0.08, p = .015).

Hypothesis 3 was not confirmed as we did not find significant relationships between teacher-reported classroom management (structure/negativity) to self-efficacy for classroom management across waves. Within early career, self-efficacy, teacher-reported structure and negativity were all significantly associated; within mid-career, only self-efficacy and negativity were related. Negativity during early career negatively related to structure by mid-career ( $\beta = -0.22$ , SE = 0.10, p = .02).

Hypothesis 4 was not confirmed, as neither contextual resources

(school advantage and early career mentoring) or excessive demands (work overload, expectations and pressure) in early career related to self-efficacy or teacher-reported classroom management strategies at mid-career. Classroom management self-efficacy in early career also did not relate to teachers' perceived school advantage or excessive demands at mid-career. However, within early career, school advantage associated with self-efficacy ( $\psi = 0.22$ , SE = 0.07, p = .001), and mentoring with lower excessive demands ( $\psi = -0.19$ , SE = 0.08, p = .017). At mid-career, excessive demands related to greater negativity ( $\psi = 0.25$ , SE = 0.08, p = .001).

To test Hypothesis 5, we constructed two latent moderation models to examine whether perceived contextual resources and demands in early career would moderate stabilities of self-efficacies and teacherreported classroom management behaviors across time, or their interrelationships. A significant moderation effect of resources would indicate that they amplified a positive development for teachers, whereas a significant moderation of demands would indicate these exacerbated a negative development. Hypothesis 5 was partially confirmed as demands, but not resources, functioned as a moderator in the investigated relationships. Experienced excessive demands during early career moderated the stability of teacher-reported structure, from early until mid-career ( $\beta = -0.20$ , SE = 0.07, p = .01). Simple slope analyses showed that stability of teacher-reported structure was higher at lower levels ( $\beta = 0.74$ , SE = 0.14, p < .001) than at higher levels of demands in early career ( $\beta = 0.34$ , SE = 0.13, p = .01; see Fig. 3). Further, experienced excessive demands in early career moderated the relationship between early career classroom management self-efficacy and mid-career teacher-reported structure ( $\beta = -.16$ , SE = 0.06, p = .01; although, simple slopes were not significant at high  $(\beta = 0.16, SE = 0.12, p = .18)$  or low levels of demands  $(\beta = -0.14, p = .18)$ SE = 0.11, p = .19; see Fig. 4).



Fig. 2. Structural equation model for the examined relationships.

*Note.* Only statistically significant (p < .05) standardized coefficients are depicted. All (significant and nonsignificant) correlations among the variables are reported in Table 4.

Table 3					
Standardized regression coefficients	( $\gamma$ , $\beta$ ) for the late	nt variable cross-lagged	l structural	equation	model

Variable	Self V	N3		Struc	W3		Neg V	W3		Ν	/lent	W3		Adva	in W3		Dem	W3		Mont	hs W3	
	γ	SE	р	γ	SE	р	γ	SE	р	γ		SE	р	γ	SE	р	γ	SE	р	γ	SE	р
Women	.01	0.04	.99	.11	0.05	.03	18	0.06	.01		.07	0.08	.38	13	0.05	.02	08	0.05	.08	06	0.05	.25
Age	02	0.05	.69	.01	0.06	.98	10	0.06	.10	-	.10	0.06	.11	.07	0.06	.23	03	0.06	.63	.11	0.05	.03
Lang	.01	0.05	.95	.01	0.06	.88	.14	0.07	.06		.06	0.06	.31	02	0.06	.69	.02	0.05	.74	.13	0.06	.02
Income	.04	0.05	.44	01	0.07	.97	01	0.07	.97		.04	0.07	.60	.18	0.06	.01	04	0.07	.62	.06	0.05	.26
Secondary	01	0.05	.86	21	0.05	.00	.12	0.06	.07	-	.05	0.09	.63	09	0.05	.11	.15	0.05	.00	.16	0.05	.001
Self W2	.51	0.07	.00	.25	0.08	.00	19	0.08	.02		.13	0.08	.08	17	0.08	.03	05	0.08	.50	.09	0.06	.11
R <sup>2</sup>	.27			.14			.11				.05 r	1.S.		.08			.04	n.s.		.08		
Variable	Self V	N4		Struc	W4		Neg V	N4						Adva	in W4		Dem	W4		Mont	hs W4	
	β	SE	р	β	SE	р	β	SE	р					β	SE	р	β	SE	р	β	SE	р
Self W3	.62	0.13	.00	02	0.13	.89	.11	0.14	.45					.01	0.05	.93	01	0.06	.93	_b		
Struc W3	.01	0.11	.95	.56	0.11	.00	15	0.12	.22					_b			_b			_b		
Neg W3	11	0.10	.25	22	0.10	.02	.60	0.09	.00					_b			_ <sup>b</sup>			_ <sup>b</sup>		
Months W3	02	0.04	.59	.01	0.05	.99	06	0.05	.24					_ <sup>a</sup>			_ <sup>b</sup>			.45	0.04	.00
Advan W3	04	0.07	.54	.03	0.07	.70	01	0.07	.86					.72	0.05	.00	_a			_ <sup>b</sup>		
Ment W3	.02	0.06	.73	.05	0.06	.44	06	0.07	.37					_a			_a			_ <sup>b</sup>		
Demand W3	.07	0.06	.26	.07	0.06	.26	05	0.06	.41					.17	0.05	.00	.36	0.06	.00	_ <sup>b</sup>		
$R^2$	.45			.45			.40							.56			.13			.20		

*Note.*  $\gamma$  = regression coefficients from exogenous to endogenous variables;  $\beta$  = regression coefficients between endogenous variables. \*p < .05; \*\*p < .01; \*\*\*p < .001. W2 = wave 2; W3 = wave 3; W4 = wave 4; Self = Teacher-reported classroom management self-efficacy; Struc = Teacher-reported structure; Neg = Teacher-reported negativity; Lang = English speaking; Secondary = Secondary school teacher; Advan = School advantage; Demand = Excessive demands; Ment = Mentoring; Months = Months of teaching experience. Significant latent correlations between independent variables:  $\varphi$  = -0.13, p = .02 for self-efficacy W2 and secondary;  $\varphi$  = 0.10, p = .03 for income and women;  $\varphi$  = -0.22, p < .001 for women and secondary;  $\varphi$  = 0.16, p < .001 for secondary and age. <sup>a</sup>The path was removed from the model as it was not significant. <sup>b</sup>The path was not included in the model.

## 4. Discussion

The present study has extended previous research in a necessary way, by addressing longer time periods in teaching, which map to teachers' career development from qualification until mid-career, considering potential reciprocal relationships between classroom management self-efficacy and teacher-reported classroom management over this period, and the role of teachers' perceived school contextual resources and demands in these processes. Previous longitudinal studies (i.e., Holzberger et al., 2013; Praetorius et al., 2017) focused on much shorter time periods among only secondary mathematics teachers within German gymnasium schools (the highest track schools in

## Table 4

Correlated unique	enesses (ψ) fro	om the structu	ral equation mode
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Variable	Self W	/3		Struc	W3		Neg V	V3		Ment	W3		Adva	n W3		Dem	W3	
	ψ	SE	р	Ψ	SE	р	Ψ	SE	р	Ψ	SE	р	Ψ	SE	р	ψ	SE	р
Self W3 Struc W3	.75	0.05	.00	26	0.08	00												
Ment W3 Advan W3 Demand W3 Months W3	.14 .22 01 .26	0.09 0.07 0.07 0.05	.00 .17 .001 .97 .00	.06 .01 03 .15	0.09 0.07 0.07 <b>0.05</b>	.48 .97 .72 .01	07 13 .12 11	0.10 0.08 0.07 0.07	.48 .10 .10 .11	.03 <b>19</b> .05	0.08 <b>0.08</b> 0.08	.66 <b>.02</b> .58	.05 .13	0.07 <b>0.06</b>	.46 <b>.04</b>	.17	0.08	.01
Variable	Self W	/4		Struc	W4		Neg V	V4					Adva	n W4		Dem	W4	
Variable	Self W	/4 SE	р	Struc	W4 SE	р	Neg V ψ	V4 SE	р				Adva ψ	n W4 SE	р	Dem ¥	W4 SE	р
Variable Self W4 Struc W4 Neg W4 Advan W4 Demand W4 Monthe W4	Self W ψ6903 .14 .01 03	SE 0.07 0.14 0.08 0.08 0.07	p .00 .84 .09 .88 .65	Struc ψ17060104	W4 SE 0.12 0.09 0.08 0.06	p .17 .47 .91	Neg V Ψ 08 .25	V4 SE 0.09 0.08 0.07	p .37 .00 79	04	0.08	.63	Adva Ψ	n W4 SE	p	Dem W	W4 SE	р

*Note.* \*p < .05; \*\*p < .01; \*\*\*p < .001. W2 = wave 2; W3 = wave 3; W4 = wave 4; Self = Teacher-reported classroom management self-efficacy; Struc = Teacher-reported structure; Neg = Teacher-reported negativity; Lang = English speaking; Secondary = Secondary school teacher; Advan = School advantage; Demand = Excessive demands; Ment = Mentoring; Months = Months of teaching experience.

![](_page_8_Figure_2.jpeg)

Fig. 3. Moderation of the stability of reported structure (waves 3 to 4) by demands at wave 3.

![](_page_8_Figure_4.jpeg)

Fig. 4. Moderation of the relationship between self-efficacy (wave 3) and reported structure (wave 4) by demands at wave 3.

Germany), including teachers with diverse lengths of teaching experience at each measured occasion that were not mapped to time teaching in the profession. We examined a longer timespan mapped to teachers' time in career, and included teachers of subjects beyond mathematics as well as primary and secondary school teachers across all school systems. We extended existing teacher self-efficacy knowledge and theory by drawing on theoretical propositions from the Job Demands-Resources model regarding the role of contextual resources and demands for these developmental dynamics.

#### 4.1. Stability of self-efficacy for classroom management

We had hypothesized (Hypothesis 1) in line with previous findings (Brouwers & Tomic, 2000; Klassen & Chiu, 2010) that classroom management self-efficacy during early career would be less stable than among more experienced teachers. However, this hypothesis was not supported. Our results showed that stability did not depend on length of teaching experience, nor significantly differ between early to mid-career than from completing teacher education until early career. In line with the theoretical assumption of Bandura (1997) that self-efficacy is relatively stable once established, our findings suggest that classroom management self-efficacy had already become established during teacher education. This is when future teachers begin their practical experiences with students in classrooms, and may already experience strategies such as practising classroom management skills in authentic contexts, and instruction focused on reducing anxiety (Bresó, Schaufeli, & Salanova, 2011) or promoting emotion regulation (Sutton et al., 2009). This may provide an explanation for the high stability of teachers' self-efficacy for classroom management that we discerned from their end of teacher education until mid-career.

Alternative explanations might include the existence of other contextual moderators (e.g., time pressure, discipline problems, low student motivation, supportive colleagues, collective school culture and value consonance; see Skaalvik & Skaalvik, 2018). Or, as teaching becomes more complex across teachers' careers, more experienced teachers may shift their focus to aspects of teaching other than classroom management, with ramifications for their self-efficacy. For example, building and sustaining relationships with students may become more important, given findings of declining teacher-student relationship quality throughout the school year from observational data (of ten Dutch and ten Indonesian middle-school teachers; Maulana, Opdenakker, Stroet, & Bosker, 2013), prompting more experienced teachers to shift their focus from classroom management to relationships. Finally, potential short-term fluctuations in teachers' self-efficacy could not be detected, because we assessed data at three timepoints across a long timespan of teachers' careers.

# 4.2. Relationships between classroom management self-efficacy and teacher-reported classroom management behaviors

Previous studies that focused on teachers who had a wide range of teaching experience (Holzberger et al., 2013) showed that general self-efficacy mattered for their self-reported behavior of learning support and vice versa, but not for student-reported teacher behaviors. When mapping timepoints of measurement to development within the teaching career, our findings showed teachers' initial self-efficacy functioned as a personal resource that positively predicted their perceived teaching behavior in early career, confirming our expectations for Hypothesis 2. Early career self-efficacy positively related to teacher-reported structure by mid-career, dependent on their level of experienced excessive demands during early career.

Individual factors such as gender were relevant for reported structure (women higher) and negativity (women lower), as was school level (although men were underrepresented at the primary school level). Concordant with their higher reported excessive demands, teachers in secondary schools reported lower structure, which might be a result of challenges they face including declining student motivation (Watt, 2004) and high levels of emotional exhaustion (Klusmann et al., 2008).

By mid-career, early career self-efficacy no longer related to reported negativity, and early career negativity negatively related to midcareer reported structure, suggesting that a maladaptive style of managing student behaviors when starting as a teacher makes it difficult for teachers to develop adaptive teaching approaches in future. Our findings indicated teacher-reported negativity as highly stable from early until mid-career, suggesting that negative responding once established becomes resistant to change. Previous studies also showed observer-rated negative teaching behaviors were highly stable across the school year (Maulana et al., 2013). Other longitudinal studies showed growth in repressive teaching among experienced teachers, accompanied by a decrease in cooperative behavior (for a review of longitudinal studies on teaching behaviors, see Wubbels, Brekelmans, den Brok, & Van Tartwijk, 2006). The authors interpreted the growth in negative teaching behaviors as a consequence of increases in students' problematic classroom behaviors, brought about by increasing demands on students as they progress through schooling, that at first can be handled by the teacher, but that gradually pose a threat to positive teaching behavior.

These developmental dynamics emphasize the need to help teachers reduce teaching negativity and assist them to reflect on challenges they face over the course of their teacher education and during early career. For future research it will be important to assist teachers to recognize the role of negative emotions when they are triggered as a result of interactions in the classroom, as well as expand their repertoire both of classroom management strategies (Krauss et al., 2008) and emotion regulation strategies (e.g., reappraisal and suppression; see Sutton et al., 2009).

Addressing our Hypothesis 3, we did not find reciprocal effects from teacher-reported classroom management behaviors to self-efficacy, not even when considering potential moderators of resources and demands, although within timepoints we did observe relationships. This is in contrast to Holzberger et al. (2013) who used a general measurement of

teacher self-efficacy and focused on a shorter timespan of 12 months, whereas our longer timespan may not have been able to detect such effects (see Praetorius et al., 2017). Fluctuations may occur over short time periods in response to the demands of individual classes of students, where poor student attentiveness and behavior challenge teachers' self-efficacy, and highly engaged students bolster their confidence in classroom management (Skinner & Belmont, 1993). Further research is needed with multiple occasions of measurement embedded within long-term studies to discern potential shorter-term effects which contribute to longer-term outcomes.

## 4.3. Contextual resources and demands

Our integration of theoretical tenets derived from both self-efficacy theory and the JDR model proved fruitful, in highlighting associations of teachers' perceived school resources and demands with their classroom management self-efficacy and self-reported classroom management strategies, as well as highlighting circumstances under which teachers' self-efficacy for classroom management stimulated subsequent teacher-reported classroom management strategies. Addressing our Hypothesis 4 concerning main effects of experienced contextual resources and demands, our expectations were partially confirmed. Although no longitudinal main effects of school resources or demands were identified, within-timepoint relationships occurred. During early career, teachers reported higher self-efficacy for classroom management when working in advantaged schools, in line with previous studies (Freeman et al., 2014). This may be explained by the better conditions teachers experience in advantaged schools including higher student achievement, and better school resources and facilities. Teachers who work in such settings may be confronted with fewer disruptions and less problematic student behaviors, producing lower levels of stress, and consequently feel more efficacious in managing their classrooms. Although early career mentoring was unrelated to self-efficacy or teacherreported classroom management behaviors, it inversely related to excessive demands in early career. A possible explanation for non-significant relationships in our study is our assessment focused on the provision, but not the quality of mentoring, which has been found to be more important in fostering the growth of teacher self-efficacy (see Richter et al., 2013).

By mid-career, school advantage no longer related to self-efficacy or reported teaching behaviors indicating that teachers later in their careers might depend less on contextual resources in their self-evaluations. The finding that teachers at a later stage of their careers might depend less on contextual resources is very interesting, perhaps due to their greater accumulation of mastery experiences (Tschannen-Moran & Woolfolk Hoy, 2007). However, it was noticeable that within mid-career, excessive demands still related to teaching negativity.

Addressing our Hypothesis 5 (moderation by resources and demands), we discovered that experienced excessive demands during early career played an important moderating role both for sustaining perceived structured classroom management, and, for the stimulating effect of self-efficacy on structure from early until mid-career. These findings are in line with theoretical assumptions of the JDR model, by showing that job demands undermined the benefits of self-efficacy as a personal resource. We were, however, not able to show that this personal resource 'buffered' against negative effects of contextual demands (Demerouti et al., 2001). Extending previous studies that applied the JDR model to the teaching profession (De Neve et al., 2015; Putwain & von der Embse, 2019), we examined specific interactions between the personal resource of teachers' self-efficacy and selected perceived job resources/demands. In future research, and to more directly inform practical implications, it will consequently be important to expand the range of examined context moderators, for example: time pressure, discipline problems, student motivation, supportive colleagues, collective school culture and value consonance (Skaalvik & Skaalvik, 2018). Our findings show that neglecting context in investigations of how self-efficacy may impact teaching behaviors over time could mask important relationships.

## 4.4. Limitations and conclusions

Our study has some limitations that should be considered when interpreting the findings. First, we used teacher reports of their classroom management behavior, which may share method bias with selfefficacy and other measured factors. Common method variance (attributable to the same measurement method) can cause biases due to inflated relationships between measures (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). To be able to show that we assessed different latent constructs in this study, we conducted additional factor analyses showing that teachers' self-efficacy for classroom management and teacher-reported structure were clearly separable (Appendix D). Although it is a limitation of this study that student reports could not be included, previous research (Kunter & Baumert, 2006; Wagner et al., 2016) showed high agreement between teacher reports and student ratings of classroom management in particular, which was the focus of our study. Those authors explained their findings by the fact that classroom management behaviors often refer to specific, denotable, relatively objective behavior. Wagner et al. (2016) further showed that teacher ratings of classroom management revealed a substantial amount of consistency over time. However, there have been studies (see Montuoro & Lewis, 2014 for a review) that identified a disconnect between students' and teachers' perceptions of misbehavior, which might lead to different reactions of students and teachers in terms of classroom management. Limited resources and the long-term longitudinal design of this study did not allow us to assess student data or observer ratings, which future research should take into account. We worked to reduce common method bias in several ways in line with recommendations made by Podsakoff et al. (2003). For example, we guaranteed anonymity and teachers were aware that the data assessed were not used for evaluation purposes. Further, measures were short, simple, worded in a non-ambiguous way, and referred to one specific question each.

Another limitation is the low reliabilities of specific measures (i.e., teacher-reported negativity) and the limited number of items per construct (e.g., self-efficacy). The measures had to be short to optimize sample retention in the longitudinal design across many years. However, future studies need to validate our findings using more elaborated measures for the constructs under investigation. It would be necessary to validate the findings of our study in other longitudinal work using different assessment methods such as observations of teaching behaviors or student ratings of teachers' classroom management.

Our study also has important strengths, evidencing the important role of teachers' self-efficacy for classroom management for positive and negative dimensions of their reported classroom management behavior, over a long timespan mapped to teachers' development in the career, and the role of excessive demands during early career in this relationship. Another strength is that we could match facets of self-efficacy and reported behaviors. Future research could productively include additional matched facets such as for student engagement and instruction (see Tschannen-Moran & Woolfolk Hoy, 2001), together with expanding the range of examined contextual demands and resources to identify specific recommendations for policy and practice.

Key implications for practice are to prioritize the reduction of excessive demands on teachers in schools especially during early career. Our findings highlight the importance of how teachers begin their careers, as these early experiences showed enduring importance for their professional development. A reduced allocation of workload, assistance with meeting the initial professional registration requirements that teachers face in their early careers and quality mentoring programs would likely help them cope with the initial overload of demands they experience. Challenges appeared worse in secondary schools, characterized by higher levels of excessive demands and lower teacher-reported structure. Future research could focus on what factors are particularly demanding and over what timeframe of teachers' career. Pressures highlighted in the literature include performance pressure, student misbehavior, poor professional relationships with colleagues, challenging parent-teacher relationships and lack of autonomy in the workplace (Center & Callaway, 1999; Pyhältö, Pietarinen, & Salmela-Aro, 2011). Skaalvik and Skaalvik (2018) found time pressure exerted the strongest negative effects on teacher wellbeing relative to other measured demands. It is also possible that the accumulation of demands may be more important than any particular demand in and of itself.

Concerning contextual resources, although at early career perceived school advantage related positively to self-efficacy and mentoring to lower demands, we did not find enduring protective effects of the resources that we measured. A range of further resources needs to be examined in this vein, for example, colleague collaboration and support (see Skaalvik & Skaalvik, 2018). Our extension to current teacher selfefficacy research (e.g., Holzberger et al., 2013; Praetorius et al., 2017) is bolstered by drawing on propositions from the JDR model regarding the theorized role of contextual demands and resources. Findings signal the need for school practice to reduce excessive demands in order to enable teachers to develop more adaptive teaching styles and mitigate against the stressors of teaching, especially during early career. By examining the development of self-efficacy and its moderated effects, we contribute to research on the JDR model which has mostly focused on wellbeing and burnout outcomes rather than professional behaviors and rarely encompassed multiple timepoints over a long timespan. As well as main effects of contextual demands and resources, we revealed the important role of experienced excessive demands in disrupting teachers' maintenance of reported positive classroom management behavior, and the benefits of positive self-efficacy for subsequent reported behavior even over a long timeframe until teachers' mid-career.

## CRediT authorship contribution statement

**Rebecca Lazarides:** Conceptualization, Methodology, Formal analysis, Writing - original draft, Visualization. **Helen M.G. Watt:** Conceptualization, Methodology, Investigation, Resources, Data curation, Writing - original draft, Funding acquisition. **Paul W. Richardson:** Conceptualization, Investigation, Resources, Writing - original draft, Funding acquisition.

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## Appendix A. Wave 1 study sample characteristics versus other qualifying teachers

Primary	Included sample $(n = 172)$ n (%)	Other qualified teachers $(n = 501)$ n (%)	$\chi^2$	Ν	df	р
Gender			3.954	673	1	.047
men	18 (10.47)	84 (16.77)			-	
women	154 (89 53)	417 (83 23)				
Home language <sup>a</sup>	10 ( (0) (00)	(1) (00120)	7.259	672	1	.007
English	162 (94.19)	433 (86.60)				
other language	10 (5.81)	67 (13.40)				
Children	()		2,151	673	1	.143
none	45 (26.16)	161 (32.14)			-	
one or more	127 (73.84)	340 (67 86)				
Prior career			3 485	673	3	323
none	91 (52.91)	236 (47.10)	01100	0,0	U	1020
considered	35 (20.35)	135 (26.95)				
pursued	46 (26 74)	130 (25.95)				
pulsucu	M (SD)	M (SD)	F	df	$\eta_p^2$	р
			010			
Age (in years)	24.36 (7.63)	24.43 (8.15)	.012	1,668	<.001	.913
Parent income (1–9)	3.10 (1.72)	3.40 (1.91)	2.672	1, 539	.005	.103
Mother job status (1–5)	2.86 (1.33)	2.88 (1.35)	.020	1, 468	<.001	.887
Father job status (1–5)	3.58 (1.21)	3.60 (1.19)	.031	1, 494	<.001	.860
Secondary	Included sample $(n = 223)$ n (%)	Other qualified teachers ( $n = 653$ ) n (%)	$\chi^2$	Ν	df	р
Secondary	Included sample ( $n = 223$ ) n (%)	Other qualified teachers $(n = 653)$ n (%)	χ <sup>2</sup>	Ν	df	р
Secondary Gender	Included sample ( $n = 223$ ) n (%)	Other qualified teachers $(n = 653)$ n (%)	χ <sup>2</sup> 2.764	N 876	<i>df</i>	р .096
Secondary Gender men	Included sample ( <i>n</i> = 223) <i>n</i> (%) 63 (28.25)	Other qualified teachers ( <i>n</i> = 653) <i>n</i> (%) 224 (34.30)	χ <sup>2</sup> 2.764	N 876	<i>df</i> 1	р .096
Secondary Gender men women	Included sample ( <i>n</i> = 223) <i>n</i> (%) 63 (28.25) 160 (71.75)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70)	χ <sup>2</sup> 2.764	N 876	df 1	р .096
Secondary Gender men women Home language <sup>a</sup>	Included sample ( <i>n</i> = 223) <i>n</i> (%) 63 (28.25) 160 (71.75)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70)	$\frac{\chi^2}{2.764}$ 9.335	N 876 870	df 1 1	p .096 .002
Secondary Gender men women Home language <sup>a</sup> English	Included sample (n = 223) n (%) 63 (28.25) 160 (71.75) 199 (90.05)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20)	χ <sup>2</sup> 2.764 9.335	N 876 870	df 1 1	р .096 .002
Secondary Gender men women Home language <sup>a</sup> English other language	Included sample ( <i>n</i> = 223) <i>n</i> (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80)	χ <sup>2</sup> 2.764 9.335	N 876 870	df 1 1	р .096 .002
Secondary Gender men women Home language <sup>a</sup> English other language Children	Included sample ( <i>n</i> = 223) <i>n</i> (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80)	χ <sup>2</sup> 2.764 9.335 .451	N 876 870 876	df 1 1	p .096 .002 .502
Secondary Gender men women Home language <sup>a</sup> English other language Children none	Included sample ( <i>n</i> = 223) <i>n</i> (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95) 70 (31.39)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80) 221 (33.84)	χ <sup>2</sup> 2.764 9.335 .451	N 876 870 876	df 1 1 1	p .096 .002 .502
Secondary Gender men women Home language <sup>a</sup> English other language Children none one or more	Included sample ( <i>n</i> = 223) <i>n</i> (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95) 70 (31.39) 153 (68.61)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80) 221 (33.84) 432 (66.16)	χ <sup>2</sup> 2.764 9.335 .451	N 876 870 876	df 1 1	p .096 .002 .502
Secondary Gender men women Home language <sup>a</sup> English other language Children none one or more Prior career	Included sample (n = 223) n (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95) 70 (31.39) 153 (68.61)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80) 221 (33.84) 432 (66.16)	χ <sup>2</sup> 2.764 9.335 .451 2.472	N 876 870 876 876	df 1 1 1 2	p .096 .002 .502 .291
Secondary Gender men women Home language <sup>a</sup> English other language Children none one or more Prior career none	Included sample (n = 223) n (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95) 70 (31.39) 153 (68.61) 95 (42.60)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80) 221 (33.84) 432 (66.16) 272 (41.65)	χ <sup>2</sup> 2.764 9.335 .451 2.472	N 876 870 876 876	df 1 1 1 2	р .096 .002 .502 .291
Secondary Gender men women Home language <sup>a</sup> English other language Children none one or more Prior career none considered	Included sample $(n = 223)$ n (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95) 70 (31.39) 153 (68.61) 95 (42.60) 57 (25.56)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80) 221 (33.84) 432 (66.16) 272 (41.65) 200 (30.63)	$\chi^2$ 2.764 9.335 .451 2.472	N 876 870 876 876	df 1 1 2	p .096 .002 .502 .291
Secondary Gender men women Home language <sup>a</sup> English other language Children none one or more Prior career none considered pursued	Included sample $(n = 223)$ n (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95) 70 (31.39) 153 (68.61) 95 (42.60) 57 (25.56) 71 (31.84)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80) 221 (33.84) 432 (66.16) 272 (41.65) 200 (30.63) 181 (27.72)	χ <sup>2</sup> 2.764 9.335 .451 2.472	N 876 870 876 876	df 1 1 2	p .096 .002 .502 .291
Secondary Gender men women Home language <sup>a</sup> English other language Children none one or more Prior career none considered pursued	Included sample $(n = 223)$ n (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95) 70 (31.39) 153 (68.61) 95 (42.60) 57 (25.56) 71 (31.84) M (SD)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80) 221 (33.84) 432 (66.16) 272 (41.65) 200 (30.63) 181 (27.72) M (SD)	$\chi^2$ 2.764 9.335 .451 2.472 <i>F</i>	N 876 870 876 876 4f	$df$ 1 1 1 2 $\eta_p^2$	р .096 .002 .502 .291
Secondary Gender men women Home language <sup>a</sup> English other language Children none one or more Prior career none considered pursued Are (in years)	Included sample $(n = 223)$ n (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95) 70 (31.39) 153 (68.61) 95 (42.60) 57 (25.56) 71 (31.84) M (SD) 27 07 (8 70)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80) 221 (33.84) 432 (66.16) 272 (41.65) 200 (30.63) 181 (27.72) M (SD) 26 54 (8.805)	χ <sup>2</sup> 2.764 9.335 .451 2.472 <i>F</i>	N 876 870 876 876 df	$df$ 1 1 1 2 $\eta_p^2$ 001	p .096 .002 .502 .291 p 
Secondary Gender men women Home language <sup>a</sup> English other language Children none one or more Prior career none considered pursued Age (in years) Parent income (1 9)	Included sample $(n = 223)$ n (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95) 70 (31.39) 153 (68.61) 95 (42.60) 57 (25.56) 71 (31.84) M (SD) 27.07 (8.70) 2.32 (1.83)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80) 221 (33.84) 432 (66.16) 272 (41.65) 200 (30.63) 181 (27.72) M (SD) 26.54 (8.805) 2.7 (1.84)	$\chi^2$ 2.764 9.335 .451 2.472 <i>F</i> .617 162	N 876 870 876 876 876 df 1, 859 1, 718	df 1 1 1 2 $\eta_p^2$ .001 < 001	p .096 .002 .502 .291 p .432 .697
Secondary Gender men women Home language <sup>a</sup> English other language Children none one or more Prior career none considered pursued Age (in years) Parent income (1–9) Mether (1–5)	Included sample $(n = 223)$ n (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95) 70 (31.39) 153 (68.61) 95 (42.60) 57 (25.56) 71 (31.84) M (SD) 27.07 (8.70) 3.33 (1.83) 2 7.07 (8.70)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80) 221 (33.84) 432 (66.16) 272 (41.65) 200 (30.63) 181 (27.72) M (SD) 26.54 (8.805) 3.27 (1.84) 2.98 (1.39)	χ <sup>2</sup> 2.764 9.335 .451 2.472 F .617 .163 .629	N 876 870 876 876 876 df 1, 859 1, 718 1, 614	$df$ 1 1 2 $\eta_p^2$ .001 <001	p .096 .002 .502 .291 p .432 .687 .414
Secondary Gender men women Home language <sup>a</sup> English other language Children none one or more Prior career none considered pursued Age (in years) Parent income (1–9) Mother job status (1–5) Esthera is be status (1–5)	Included sample (n = 223) n (%) 63 (28.25) 160 (71.75) 199 (90.05) 22 (9.95) 70 (31.39) 153 (68.61) 95 (42.60) 57 (25.56) 71 (31.84) M (SD) 27.07 (8.70) 3.33 (1.83) 2.78 (1.40) 2.69 (1.10)	Other qualified teachers (n = 653) n (%) 224 (34.30) 429 (65.70) 527 (81.20) 122 (18.80) 221 (33.84) 432 (66.16) 272 (41.65) 200 (30.63) 181 (27.72) M (SD) 26.54 (8.805) 3.27 (1.84) 2.88 (1.38) 2.6 (1.00)	χ <sup>2</sup> 2.764 9.335 .451 2.472 <i>F</i> .617 .163 .668 .668 .668	N 876 870 876 876 <i>df</i> 1, 859 1, 718 1, 614 1, 621	df 1 1 1 2 $\eta_p^2$ .001 <.001 .001 .001	р .096 .002 .502 .291 р .432 .687 .414 .045

*Notes.* Income values: 1: \$0-30,000, 2: \$30,001-60,000, 3: \$60,001-90,000, 4: \$90,001-120,000, 5: \$120,001-150,000, 6: \$150,001-180,000, 7: \$180,001-210,000, 8: \$210,001-240,000, 9: \$240,000+. Job status coded according to ONET, https://www.onetonline.org/.

<sup>a</sup> ns do not sum to totals due to missing data for home language (2 study participants and 5 others).

## Appendix B. Subscale items

### Subscale and items

Teacher self-efficacy for classroom management [teacher-reported]
How certain are you that you can
manage disobedient students?
establish a classroom management system with each group of students?
Structure [teacher-reported]
To what extent do students in your classes feel
they know what will happen if they break a class rule?
they have an explicit set of class rules to follow?
there are clear expectations about student behavior?
Negativity [teacher-reported]
To what extent do students in your classes feel
worried you might react negatively if they don't understand?
feedback they get from you is sometimes too negative?
you might react negatively towards their mistakes?
some students are treated better than others?

## Appendix C. Model Fit Indices for Measurement Invariance Testing

	$\chi^2$	df	$\Delta\chi^2$	Δdf	CFI	ΔCFI	TLI	ΔTLI	RMSEA	ΔRMSEA	SRMR	$\Delta$ SRMR
Configural invariance <sup>a</sup>	522.65	391	-	-	.97	-	0.96	-	0.03	-	0.05	-
Metric invariance <sup>b</sup>	525.98	402	4.89	11	.97	0.002	0.97	0.003	0.03	-0.001	0.05	0.001

Note. CFI = comparative fit index; RMSEA = root-mean-square error of approximation; SRMR = standardized root-mean-square residual.

<sup>a</sup> Factor loadings freely estimated.

<sup>b</sup> Factor loadings constrained equal over time.

## Appendix D. Confirmatory Factor Analyses: Teacher Self-Efficacy for Classroom Management and Reported Structure

Model 1: 4-factor solution including to	eacher self-efficacy at waves 3 and	4 (two latent factors) and teacher-rep	orted structure at waves 3 and 4	(two latent factors)							
$\chi^2 (df)$	RSMEA	CFI/TLI	SRMR	BIC							
57.117 (30)	0.048	0.981/.971	0.040	9438.314							
Model 2: 2-factor solution including one latent factor at wave 3 (items for teacher self-efficacy and teacher-reported structure) and one similarly latent factor for wave 4											
$\chi^2$ (df)	RSMEA	CFI/TLI	SRMR	BIC							
251.641 (36)	0.124	0.849/.811	0.066	9611.763							

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