

Leadership in Schools and Teacher Well-Being: An Investigation of Influence Processes

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Dissertation zur Erlangung der Doktorwürde
an der Philosophischen Fakultät der Universität Freiburg (Schweiz)

Genehmigt von der Philosophischen Fakultät auf Antrag der Professorin und Professoren
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Freiburg, den 1. Juni 2021
Prof. Bernadette Charlier, Dekanin

Acknowledgments

I am grateful for the support and encouragement that I have received from many sides over the past years. I would like to thank

... my supervisor at the University of Fribourg, Prof. Dr. Petra Klumb, for her advice, support, patience, and feedback throughout this process, for always creating a positive and constructive atmosphere on the research days and for making me feel welcome as an external doctoral student.

... my supervisor at the PHBern, Prof. Dr. Ueli Hostettler, for his continuous support, trust and appreciation, and as a programme coordinator of the Research and Development Programme “Governance in Education” for his efforts to make sure that we have a positive work environment.

... Prof. Dr. Jörg Felfe, for agreeing to review this dissertation, for his time and expertise.

... the co-authors of the three studies, Prof. Dr. Ueli Hostettler, Prof. Dr. Petra Klumb and Prof. Dr. Julia Warwas for the collaboration, discussions, and helpful feedback.

... my colleagues at the Research and Development Programme “Governance in Education” at the PHBern who contributed to the success of the three research projects that are the basis for the three studies of this dissertation.

... the PHBern for making it possible to conduct the research and for supporting my professional development and allowing me to advance my statistical skills during summer schools.

... all the participants of the dissertation studies for their time and effort.

... Beatrice Aregger for proofreading parts of this dissertation.

... my family and friends for their understanding, support, and patience.

Abstract

Teaching is a meaningful and rewarding occupation but can also be challenging and stressful. Being well is an essential basis for teachers to do their work well. Moreover, teacher well-being is also linked to the quality of the education system as a whole and to the well-being and learning of students. Teacher well-being is influenced by different factors, such as personal resources and the job demands and job resources at their workplace. School leadership can function as such a job resource and directly influence teacher well-being. Apart from that, influence on teacher well-being can also be indirect, via effects of leadership on features of the working environment in the schools. As several issues regarding school leadership and teacher well-being require more and closer attention, this dissertation aims to investigate the processes that connect constructive leadership in schools and teacher well-being.

To this end, three studies investigated types of constructive leadership in schools and the processes through which they relate to a range of indicators of teacher well-being. The first study, with a cross-sectional design, examined effects of individual-focused and group-focused transformational leadership on individual and collective teacher efficacy simultaneously and further studied the moderating role of principals' span of control. The second study, with a daily diary design, focused on effects of constructive vertical leadership by the formal leader as well as constructive shared leadership by the colleagues in teachers' daily work life. The third study had a longitudinal design to compare three process models of the effects of leader support on team social resources and work engagement.

The results of the three dissertation studies show that constructive vertical leadership in schools is related to different dimensions of teacher well-being, such as fluctuating affective states like pleasant affect and state work engagement in teacher daily work life as well as to more stable experiences like teacher efficacy and work engagement. These effects occur through different processes, such as through dyadic interactions of the principal with each follower, through leader-group interactions as well as indirectly, via interaction quality and team social resources. While teachers reported to experience shared constructive leadership by their colleagues, this type of leadership did not have any effects on teacher well-being in our sample. The results highlight not only the importance of vertical leadership in school for teacher well-being but also the value of having positive social interactions at work.

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1. Introduction

Schools are major institutional building blocks of our society. They are the places where our children spend a considerable time of their daily lives and where they acquire basic knowledge and competencies in a range of subjects. Furthermore, they are supported in the development of their unique personalities, in learning social and cultural skills and finding a place in society (Erziehungsdirektion des Kantons Bern, 2016). Teachers play a central role in this process and they are “the most important in-school factor contributing to student success, satisfaction and achievement” (Viac & Fraser, 2020, p. 7).

To do their work well, teachers need to feel competent and believe in their ability to influence student outcomes (teacher self-efficacy, e.g. Skaalvik & Skaalvik, 2007), feel engaged in their work (Addimando, 2019) and have positive affective experiences in their day to day work – in other words, experience well-being (van Horn et al., 2004). Well-being of students can only be attained if the teachers also experience well-being (Louis & Murphy, 2018). The Organisation for Economic Co-operation and Development (OECD) has decided, for this reason, to start with the assessment of teacher well-being as part of their large scale assessments, in the teacher questionnaire of PISA 2021 (Programme for International Student Assessment; Viac & Fraser, 2020).

Among the factors that influence employee well-being, such as job stressors, job resources, interpersonal factors, personal resources, and the work-home interface (Sonnetag, 2015), leadership has a special function. Leadership can function as an interpersonal factor, yet it can also influence job stressors and resources. Leadership has been connected to employee well-being generally (e.g. Kuoppala et al., 2008; Skakon et al., 2010) and also in the school context (e.g. Berkovich & Eyal, 2015; Liebowitz & Porter, 2019). However, with regard to leadership in schools and teacher well-being, there are several issues that require more and closer attention. Particularly, we do not know much about the respective processes yet. This includes questions such as: Through what mechanisms at which analytical levels (e.g. individual, group) does school leadership affect teacher well-being? How do these effects unfold on different levels and over time? What effects of leadership can we find in teachers daily work life? Further, there are issues regarding conceptualizations of leadership in school leadership research, such as focussing on leadership by the formal leader only and ignoring leadership influence that stems from other sources. By examining such questions, this dissertation aims to enhance the existing knowledge about school leadership and teacher well-being. By focussing on constructive forms of leadership and teacher well-being, my approach is linked to positive psychology (Louis & Murphy, 2018; Seligman et al., 2009) and I hope to contribute to “creating school settings where all people flourish” (Louis & Murphy, 2018, p. 166).

2. Teacher well-being and constructive leadership

In this chapter, I first describe what teacher well-being involves and why it is not only important for the teachers themselves but also for student outcomes (Chapter 2.1). I then provide a brief insight into school leadership research (Chapter 2.2.) before asking what kind of leadership promotes well-being (Chapter 2.3). After that, a broader perspective on leadership is introduced (shared leadership, Chapter 2.4), before focussing on different processes connecting leadership and teacher well-being on multiple levels (Chapter 2.5) and different research perspectives that can be used to study them (Chapter 2.6).

2.1 Teachers' work-related well-being

While teaching can be a very rewarding occupation (Skaalvik & Skaalvik, 2017) and the majority of teachers report to be satisfied with their job (Brägger, 2019), their work is also known to be challenging and tiring. Teachers often experience job demands such as high workload, classroom disturbances or conflicts with parents (Collie et al., 2012; Klassen & Chiu, 2010). Being exposed to excessive demands over time can lead to symptoms of burnout, such as emotional exhaustion (Baeriswyl et al., 2014; Lesener, Gusy, & Wolter, 2019). In a Swiss study, about a third of teachers reported high symptoms of burnout (Kunz Heim et al., 2014). Teachers with low levels of well-being are more likely to leave the profession (Skaalvik & Skaalvik, 2018), to perform poorly or to be absent, all of which is detrimental for the education system as a whole (Viac & Fraser, 2020). Apart from these negative effects for the teachers themselves and the education system (also called “inward outcomes”) teacher well-being is related to student learning and student well-being (“outward outcomes”, Viac & Fraser, 2020). For instance, teachers under stress receive lower ratings from their pupils for the quality of their instruction (Klusmann et al., 2006) and teacher burnout is related to lower student motivation (Shen et al., 2015).

In the organizational psychology literature, work-related well-being is often conceptualized in terms of affect quality. Different affective indicators of well-being can further be distinguished according to their degree of activation (low – high) and pleasure (unpleasant – pleasant) in a circumplex model of affect (Bakker & Oerlemans, 2013; Mäkikangas et al., 2016; Russell, 2003). While affective well-being is considered the core of employee well-being, there are broader conceptualizations that also involve non-affective dimensions. In their multidimensional model of occupational well-being, Van Horn et al. (2004) distinguish between *affective*, *cognitive*, *professional*, *social*, and *psychosomatic* dimensions (for a slightly modified model see Viac & Fraser, 2020). Confirmatory factor analyses supported the distinction between these dimensions and also showed an underlying second-order factor (van Horn et al., 2004). Teacher well-being can therefore be defined “as a positive evaluation of various aspects of one’s job, including affective, motivational, behavioural, cognitive and psychosomatic dimensions” (van Horn et al.,

2004, p. 366) or “individuals’ positive evaluations of and healthy functioning in their work environment” (Collie et al., 2015, p. 746).

The *affective dimension* of teacher well-being includes positive and negative affective experiences, they can be fluctuating affective states such as pleasant affect and state work engagement or more stable experiences such as job satisfaction and emotional exhaustion (Sonnentag, 2015; van Horn et al., 2004). Several studies have related teachers’ affective well-being to student outcomes: Teachers expression of positive emotions was related to student motivation and well-being (Sutton & Wheatley, 2003) and to student achievement (Tadić et al., 2013). Teachers self-reported emotions (enjoyment, anger and anxiety) were related to students’ perceptions of teaching quality (Frenzel, Goetz, Stephens, & Jacob, 2009), and teacher enjoyment was related to student enjoyment (mediated by teachers’ displayed enthusiasm, Frenzel, Goetz, Lüdtke, et al., 2009). One study found that teachers weekly work engagement was related to in-role and extra-role performance (Bakker & Bal, 2010) and teachers who were more engaged used a larger range of teaching practices in the classroom (Addimando, 2019). In addition, teacher commitment is positively associated with student learning, as Sun and Leithwood (2017) show in their meta-analysis. On the other hand, teachers’ emotional exhaustion was related to lower student achievement and lower school satisfaction (Arens & Morin, 2016; Klusmann et al., 2016).

The *social dimension* of teacher well-being refers to the quality of relationships with students, colleagues, parents, and other people teachers collaborate with. These relationships can be challenging, e.g., when conflicts with parents arise. On the other hand, when teachers have good relationships, this social capital (Pil & Leana, 2009) can serve as a resource. The importance of this dimension of teacher well-being is highlighted by self-determination theory, which posits the need for relatedness as one basic psychological need that must be satisfied for optimal functioning (Deci & Ryan, 2008). Teacher social well-being has been linked to student outcomes, in such a way that a positive teacher-student relationship climate was related to lower student dropout rates (Barile et al., 2012) and to higher school engagement of students (Martin & Collie, 2019). Also, high-quality collaboration in schools benefits student achievement (Ronfeldt et al., 2015).

The *professional dimension* of teacher well-being incorporates aspects of job-related motivation, self-efficacy, ambition, and achievement (van Horn et al., 2004). Teacher self-efficacy has been studied extensively. The meta-analysis by Klassen and Tze (2014) shows that teachers’ self-efficacy is related to teacher performance and associated with the achievement level of students¹.

¹ A related construct to teacher self-efficacy is collective efficacy. However, this is not an individual but an *organizational property* and refers to the shared beliefs of teachers in the *capabilities of the group*, “that the faculty as a

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A qualitative synthesis of research (Zee & Koomen, 2016) documents that teacher self-efficacy relates to students' academic adjustment, teacher behaviour and practices related to classroom quality and also to other facets of teacher well-being such as job satisfaction and commitment, which can be classified as affective well-being. The *cognitive dimension* of teacher well-being reflects teachers' cognitive functioning, such as the ability to take up new information and concentrate on their work, and the *psychosomatic dimension* refers to the quality of physical well-being as indicated by the presence or absence of psychosomatic complaints, such as headaches or stomach-aches (van Horn et al., 2004).

This multidimensional model of teacher well-being (van Horn et al., 2004) serves well to integrate the empirical evidence in this domain and to locate different aspects of well-being examined in the studies of this dissertation. At the same time, it is important to point out that the different dimensions are interrelated and can therefore be mediators as well as outcomes of leadership influence processes, that is, measures of well-being or antecedents of other measures of well-being. For instance, there are studies looking at effects of teacher self-efficacy on other aspects of well-being (Schwarzer & Hallum, 2008) or of colleague support on what the authors call "general well-being" (Aelterman et al., 2007). Moreover, one can also imagine potential trade-offs between different dimensions of well-being; some leader practices can increase one dimension of employee well-being while decreasing another (Grant et al., 2007). It is worth noting that lately increased interest in "collective well-being" (Huettermann & Bruch, 2019) has emerged, with studies that investigate for example team work engagement (Rahmadani et al., 2020) or collective efficacy (Goddard et al., 2017). As these features are located at the collective level, they are qualitatively different from individual well-being and this has consequences for their measurement and analysis (e.g. Chan, 1998, see also Chapter 2.5).

2.2. Leadership in schools

Leadership is a "social and goal-oriented influence process, unfolding in a temporal and spatial milieu" (Fischer et al., 2016, p. 1727) or – in other words – a process of "influencing and facilitating individual and collective efforts to accomplish shared objectives" (Yukl, 2012, p. 66). These definitions do not explicitly determine *who* exerts influence. While most of the leadership research has focused on formal leaders (such as the principal in school settings), lately scholars have also investigated other sources of leadership (Yammarino et al., 2012). Generally, that means that this influence process can stem from any member of the organization, whether they

whole can organize and execute the courses of action required to have a positive effect on students" (Goddard et al., 2004, p. 4). Collective efficacy is strongly related to student learning (Sun & Leithwood, 2017).

have a formal leadership position or not. This chapter focuses on leadership by the formal leader while chapter 2.4 introduces shared leadership.

2.2.1 The school context: Schools as “special organizations”

When we translate research findings from other fields into the school setting, it is important to consider the specificities/particularities of educational settings. Other types of organizations, such as businesses or healthcare organizations, have clients that mostly have short-term associations with the organization whereas in schools, the “clients” are part of the organization and their association is long-term and involuntary. Therefore, the pupils are strongly affected by the school climate and culture (Louis & Murphy, 2018). Furthermore, schools have goals that are either very open (such as student personal development) or documented in detail (e.g. educational standards, Rolff, 2012). At the same time, indicators of success are largely lacking (Rothland & Terhart, 2007). There is no “technology” in the work of teachers that can guarantee good results and goals cannot be reached without the collaboration of the students (Vanderstraeten, 2000). For teachers it is often hard to assess which part they have provided towards the “end product”, because factors influencing student learning are manifold (Soltau et al., 2012).

Schools have been described as professional bureaucracies that rely on experts (Mintzberg, 1979) or as “loosely coupled systems” (Weick, 1976) with substantial professional autonomy in the actions of the teachers. This has implications for the steering of the system and therefore for leadership. «Steering» can be more difficult, when in such systems only particular subsystems react to inputs rather than the whole system. It is therefore important that leadership creates shared goals and shared meaning for the teachers (Bischof, 2017) and encourages teacher participation and collaboration between teachers (Scheerens, 2012). It is also important to keep in mind that the role of professional school leader is relatively new and has gradually replaced the headteacher, who was seen as a *primus inter pares*, a first among equals (Hostettler & Windlinger, 2016; Pont et al., 2008).

2.2.2 School leadership research

Research on leadership in schools has so far mainly focused on leadership by the formal leader, the principal (e.g. C. Day & Leithwood, 2007; Hallinger & Heck, 1998). Generally, the aim was to identify which leadership styles or behaviours are related to the effectiveness of schools, which was mostly operationalized as student achievement outcomes. Several meta-analyses demonstrated positive effects of leadership in schools (e.g. Scheerens, 2012), especially for *transformational leadership* (e.g. Chin, 2007; Leithwood & Sun, 2012) but also for *instructional leadership* or for *specific leader practices* (Hitt & Tucker, 2016; Liebowitz & Porter, 2019) that are found in these leadership conceptions (Robinson et al., 2008). Transformational leadership is a model that stems from outside the school context (see Bass, 1999). Transformational leaders

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change their followers' attitudes and values and motivate them to look beyond their self-interests and work for the benefit of the organisation. Apart from inspiring and providing meaning, transformational leaders function as role models for their followers. At the same time, they support their followers individually and challenge them to try new ways and therefore expand their abilities (Bass & Riggio, 2006). Instructional leadership is a model of leadership unique to schools with an emphasis on improving teaching and learning (Daniëls et al., 2019) which includes defining the school's mission, managing the instructional program, or monitoring student progress (Hallinger & Murphy, 1985). Not surprisingly, "the more leaders focus their relationships, their work, and their learning on the core business of teaching and learning, the greater the influence on student outcomes" (Robinson et al., 2008, p. 636). Overall, there is a wide consensus that leadership is important for school quality in that it has a small but significant effect on student learning (Sun & Leithwood, 2017; Tan et al., 2020).

Despite the focus of most studies on student learning outcomes, they can also provide some information on effects of leadership on teacher well-being, because it soon became clear that the effect on student learning is indirect, i.e. mediated by school and teacher variables (Hendriks & Scheerens, 2013). In the case of transformational leadership, which was at the centre of a large part of leadership research, such school variables include shared decision making, better organizational culture and improved instruction, a better work environment, collective efficacy, and shared goals (Sun & Leithwood, 2017). Teacher characteristics that are influenced by transformational leadership in schools include job satisfaction and commitment and behavioural aspects such as use of knowledge and disciplinary practice (Leithwood & Sun, 2012). Tan et al. (2020) conducted a second-order meta-analysis on associations between school leadership and different school outcomes. Their results confirm that instructional and transformational leadership as well as different leadership practices such as motivating and empowering teachers are related to teacher outcomes. In their analyses, teacher outcomes include teacher well-being as well as teaching practices. Looking more narrowly at teacher well-being (as an outcome among several others), Liebowitz and Porter (2019) reported in their meta-analysis a moderate to large positive effect of different principal behaviours (which they grouped into the five categories instructional management, internal relations, organizational management, administration and external management) on teacher well-being.

Only a small number of studies carried out in school settings directly focused on the effects of principal leadership on teacher well-being. Berkovich and Eyal (2017) showed that principals' transformational leadership had an effect on the on the emotional well-being of teachers, because it leads to teachers' experience of emotional reframing. The results from the authors narrative review of studies (Berkovich & Eyal, 2015) show that in general relationship-oriented behaviours like showing consideration, being supportive and concerned about teachers' well-being increased

“teachers’ passion towards their job” (Berkovich & Eyal, 2015, p. 144) and also had effects on organizational level variables such as promoting a culture of care.

This brief overview shows that there is a solid research base connecting leadership with school quality. One of the central leadership models in school leadership research was transformational leadership (Tan et al., 2020). In the last decade, however, concerns regarding several theoretical and empirical aspects of the model have been raised (van Knippenberg & Sitkin, 2013), mainly in the general management and leadership literature, and less so in the educational administration discourse (Berkovich, 2016). Concerns include the conceptual definition of transformational leadership, which confounds behaviours with their effects, but also the lack of clarity regarding its subdimensions and related issues of measurement (van Knippenberg & Sitkin, 2013), e.g., some dimensions of transformational leadership addressing single followers while other dimensions target a group or organizational unit (Kark & Shamir, 2013, see Chapter 2.5). It is therefore important to address such shortcomings to further clarify the contribution of transformational leadership for teacher outcomes and school quality (Berkovich, 2016).

While there is ample evidence linking leadership to school quality, research on the connection between school leadership and teacher well-being is still limited. The present research will complement this evidence and the argumentation in the following chapter therefore draws on general research on leadership effects on well-being (Chapter 2.3). Further, due to the prevailing focus on the principal as the source of leadership, it is largely unclear so far, what role shared leadership plays for teacher well-being (Chapter 2.4).

2.3. What kind of leadership promotes well-being?

When we look not only at leadership in schools, but broaden our focus to leadership research in general, it is clear that leadership is an important factor for employee well-being (Donaldson-Feilder et al., 2013). Skakon et al. (2010) reviewed empirical research from nearly 30 years and concluded that “leader behaviours, the relationship between leaders and their employees and specific leadership styles were all associated with employee stress and affective well-being” (Skakon et al., 2010, p. 107). Leader behaviors that were related to employee well-being include consideration, support, and empowerment. Apart from this, transformational leadership was strongly associated with well-being at work, while results for transactional or laissez-faire leadership were less consistent. In line with this evidence, the meta-analysis of Kuoppala et al. (2008) shows that good leadership predicts job well-being. What the authors termed “good leadership” includes different types such as support, consideration, and transformational leadership, which all had similar associations with well-being. Corroborating evidence comes from a meta-analysis on leadership and followers’ mental health (Montano et al., 2017) that found

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transformational leadership, relations- and task-oriented leader behaviours and high quality leader-follower interaction to be positively associated with mental health.

All the evidence listed shows that overall *positive or constructive types of leadership* are related to employee well-being (see also Nielsen & Taris, 2019). It is difficult to determine whether specific types are differentially related to well-being, as only a few studies have investigated the relationship between different leadership constructs and well-being outcomes in one single study. Piccolo et al. (2012) found that consideration and transformational leadership both contributed incrementally to the prediction of employee job satisfaction. Further, Gregersen et al. (2014) showed that leader-member exchange best predicted employee well-being and that there were only small differences between the other leadership constructs in their prediction of well-being (consideration, initiating structure, transformational leadership and contingent reward). This is presumably due to empirical and conceptual overlap between different leadership constructs (DeRue et al., 2011; Rowold et al., 2015). Due to this overlap it seems legitimate to treat these different constructs as *types of constructive leadership*, which are positively related to employee well-being. The finding that leader-member exchange best predicted well-being may suggest that a high quality mutual relationship between leader and follower (which is how leader-member exchange is operationalized) is actually a result of constructive leader behaviours and therefore a mediator in the process influencing well-being (see also Gottfredson & Aguinis, 2017). This process linking constructive leadership and employee well-being, however, has not been widely examined yet (see Inceoglu et al., 2018). Hence, to develop a full understanding of the link between constructive leadership and employee well-being, we need to study the different processes at work and examine at which levels they unfold (such as individual or group level, see Chapter 2.5).

Like school leadership research, also general research on leadership and employee well-being has focussed mainly on formal leaders and thereby overlooked effects of leadership from other sources (shared leadership, see Chapter 2.4). Further, a leader-centric view when explaining outcomes (“romance of leadership”, e.g. Felfe & Schyns, 2014) means that situational factors are ignored. As contextual factors can moderate the relationships between leadership and follower outcomes (Porter & McLaughlin, 2006) it is important to consider the context when studying leadership and its effects.

2.4. The principal is not the only leader: Shared leadership

As mentioned in chapter 2.2. research on school leadership has broadened its focus from looking at the principal as the single leader to more collectivistic approaches. These collectivistic approaches come in various shapes and forms and under various labels such as shared leadership

(Pietsch et al., 2019), teacher leadership (Nguyen et al., 2020), distributed leadership (Tian et al., 2016), or collaborative leadership (Hallinger & Heck, 2010a).

There are several reasons for switching to a more systemic perspective of leadership. Firstly, the tasks and responsibilities involved in directing a school have intensified in such a way, that they are not easily handled by one person alone (Pont et al., 2008). Secondly, participation and cooperation are educational objectives and pedagogical principles (Huber, 2006) and, therefore, the structural conditions in schools should not only facilitate, but actively promote cooperation and individual responsibility (Rosenbusch, 2005). Finally, with the focus on the solo leader, scholars had ignored that leadership always involves multiple individuals and that influence processes are reciprocal and also present between employees or from followers to leaders (Yammarino et al., 2012).

While the different terms (shared, distributed, etc.) are often used interchangeably, they are not always operationalized and analysed in the same way (Bolden, 2011). Distributed or shared leadership can be understood in terms of distributing leadership tasks or functions (Drescher et al., 2014), in terms of distributed influence processes (Fitzsimons et al., 2011) or in terms of the relationships between people. Following from this, some studies look at the level of collaborative decision making by the leadership team (Hallinger & Heck, 2010a) or at the extent of teachers' participation in school-wide decision making (Pietsch et al., 2019), while others examine social networks (Moolenaar et al., 2010). Despite this lack of conceptual clarity, there is evidence for beneficial effects of distributed forms of leadership in the educational sector for teacher well-being as well as for student outcomes. Distribution of leadership and cooperation have positive links not only with teacher commitment and job satisfaction (Hulpia et al., 2009), but also with teacher self-efficacy, collective efficacy, and the quality of peer relationships (Nguyen et al., 2020). Furthermore, collaborative or shared leadership has positive indirect effects on student achievement (Hallinger & Heck, 2010b). These effects seem to be mediated by “the way in which teachers organize themselves into professional communities characterized by strongly held norms and values, reflective discussions about instruction, and a sense of collective responsibility for student learning” (Louis et al., 2010, pp. 330–331). The authors argue that shared leadership might have its main impact by reducing teacher isolation.

In this dissertation, I focus on shared leadership as an established concept in the field of work and organizational psychology. This “dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organizational goals or both” (Pearce & Conger, 2003, p. 1) does not only take into account that a multitude of people can exert leadership influence but also examines different types of influences (transformational, transactional, empowering, aversive, directive; Pearce & Sims, 2002). More

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precisely, employees are asked to report how often their formal leader (vertical leadership) and their colleagues (shared leadership) show certain kinds of behaviours, such as encouraging them to voice ideas and make suggestions (empowering leadership) or offering help in return for their efforts (transactional leadership). Through this approach, it is possible to analyse effects of (different types of) leadership behaviours of the formal leader (vertical leadership) at the same time as (different types of) leadership behaviours of colleagues (shared leadership) and, therefore, to examine leadership stemming from different potential sources (Piecha et al., 2012).

Considering the specificities of the school context (see Chapter 2.2.1) that involves substantial professional autonomy of the teachers paired with a degree of uncertainty that is “endemic to teaching” (Rosenholtz, 1989, p. 69), shared leadership could help to compensate for this uncertainty. This and the fact that supportive relationships with colleagues in schools are important for teachers’ well-being (Väisänen et al., 2017) suggest that shared leadership can be expected to be at least as important for teacher well-being as vertical leadership.

2.5. Processes connecting leadership and well-being on multiple levels

Because leadership happens in organizations and involves individual followers as well as collectives, it is “by nature a multiple-level phenomenon” (Chun et al., p. 689). This starts with the question of who is leading or where the influence originates from; is it the formal leader, an individual, or is influence shared or distributed and therefore can be seen as a type of group process (M. Wang et al., 2014)? Furthermore, the processes described by leadership theories can be located at the level of the individual, at the level of dyads, the team level and the level of the organization as a whole (Dionne et al., 2014). Ignored at first, the within-person level (Ashkanasy & Humphrey, 2014) has lately received increased attention (Dinh et al., 2014). Outcomes of interest, in turn, may manifest themselves at different levels: Are we interested in within-person outcomes, such as state work engagement, outcomes at the individual level, such as job satisfaction, or team-level outcomes, such as team efficacy? These different levels of analysis have to be considered and aligned for theory and hypothesis formulation, for measurement, data analysis, and inferences (Yammarino et al., 2005). While there is an increasing trend in studies distinguishing levels of analysis, overall, the majority of studies still fail to do so (Dionne et al., 2014) and most studies are still primarily involving the individual level (Yammarino & Dionne, 2018).

Closely connected to the issue of levels of analysis is the issue of processes. Although there is much evidence connecting constructive leadership with employee well-being, the mechanisms through which the effects are transmitted have not yet been widely examined (Inceoglu et al., 2018). For a better understanding of leadership and teacher well-being, we need to analyse and explain why – that is through which processes – teacher well-being is related to leadership behaviours and also take time-related issues into account (Lord & Dinh, 2012). The term *process*

”refers to a cause-mediator-effect logic” (Fischer et al., 2016, p. 1727) and explains the relationship between a cause/input (leader behaviour) a mediating mechanism that explains the causal relationship between input and output and an output (teacher well-being).

Nielsen and Taris (2019) name five ways, by which leaders can influence different aspects of their followers’ jobs and hence their followers’ well-being: Leaders affect

- the way work is organized (in schools, e.g., whether teachers are organized in teams, such as professional learning groups),
- their followers’ work content (such as the level of autonomy, the extent of administrative tasks that teachers have to carry out),
- their followers’ work requirements (such as timetables, professional development),
- their working conditions (e.g., infrastructure of the school, classrooms, workspace for teachers) and
- work relationships (e.g., the quality of teachers’ relationships with other teachers, with the principal, with parents).

In addition to these effects on *aspects of the jobs* of employees, leaders can influence their employee’s well-being *directly* through their behaviour and communication, through setting an example, e.g., role modelling health-oriented behaviour, and also via their own health (Franke et al., 2014; Franke et al., 2015). When we look at these different processes, it is obvious that they are located at different levels of analysis.

In their review, Inceoglu et al. (2018) use a slightly different categorisation, namely they look at the *psychological processes* through which leadership behaviours affect follower well-being (see also Decuyper & Schaufeli, 2020.) They identify five groups of mediators:

- social-cognitive processes (e.g. self-efficacy),
- motivational processes (e.g. fulfilment of basic psychological needs; self-determination theory, Deci & Ryan, 2008),
- affective processes (based on affective events theory, Weiss & Cropanzano, 1996, i.e. the influence of leader behaviours on the occurrence of affective events in daily work life),
- relational processes (e.g., social support from the leader) and
- identification-related processes (social identity theory; leaders shape followers’ self-concept, identification with the leader, with the team or with the organization).

The authors (Inceoglu et al., 2018) also point to the fact that differential mediator effects can be found for group-level constructs (such as collective efficacy, team work engagement) and hence future research should conceptualize specific mechanisms at different levels of analysis. It is likely that different processes on different levels happen in parallel and that they also influence

2. Teacher well-being and constructive leadership

one another, because “leadership dynamics involve multiple levels and can produce both top-down and bottom-up emergent outcomes at higher and lower levels of analysis” (Dinh et al., 2014, p. 37). In school leadership research, most studies so far have not properly accounted for the fact that leadership and its effects are a multiple-level phenomenon. As mentioned earlier, transformational leadership has mostly been treated as a phenomenon at the individual level and its dual-level effects have been ignored (X.-H. Wang & Howell, 2010). Further, in school leadership research, the level of events has been largely ignored and the processes between individual level variables and group level constructs over time are not sufficiently understood.

2.6. Leadership research perspectives

Leadership is a complex phenomenon – embedded in a context – that involves leaders, followers, and processes at different levels that unfold over time. Yet, the “typical leadership study” (Hunter et al., 2007) so far used a *cross-sectional design* and often focused on outcomes only, without considering processes (McCusker et al., 2018). In such studies, subordinates usually assess the behaviour of their leader. Thereby it is often assumed, that each subordinate has a unique relationship with the leader, as if leadership was solely a dyadic phenomenon (Hunter et al., 2007) at the level of individual leader and individual follower (Yammarino & Dionne, 2018). However, there is a growing awareness of distinct levels on which effects unfold and more studies are employing a multilevel framework (Dionne et al., 2014). Apart from the issue of levels of analysis (which is not restricted to cross-sectional studies), cross-sectional designs suffer from several other problems. The direction of effects is unclear when all variables are measured at the same occasion (Fischer et al., 2016), retrospective assessments can be biased (Beal & Weiss, 2003) and method biases can threaten the validity of conclusions (Podsakoff et al., 2003; Podsakoff et al., 2012). This does not mean that cross-sectional studies should be completely abandoned (Dinh et al., 2014). There are occasions when a well-designed cross-sectional study can be productive, because it is relatively easy to undertake and large samples can be included. Cross-sectional designs do well when the leader behaviours assessed are treated as a whole, and are seen as fairly stable (McCusker et al., 2018) or when a new approach to leadership is tested before undertaking longitudinal research (Dinh et al., 2014).

To study experiences and processes in daily life, *diary studies* (or other forms of experience sampling methods) are well suited (e.g. Gabriel et al., 2019; Ohly et al., 2010). Diary studies help understand the leadership process within an individual, in that we can find out how events impact affect and behaviours (McCusker et al., 2018). Studying experiences in “real time” (Schwarz, 2012) allows researchers to get close to peoples’ daily experiences, minimize retrospective bias associated with more global assessments, and consider within- and between-person processes (Bolger et al., 2003). With this approach, well-being can be studied as a fluctuating state and events can be identified that are associated to fluctuations from a person’s “usual” level of well-

being (Xanthopoulou et al., 2020). For studying leadership, diary studies can be used to capture daily leadership behaviours and related fluctuating experiences and behaviours of followers or leadership “styles” and related (accumulated) daily experiences and behaviours of followers (Ohly & Gochmann, 2015).

To study processes that unfold over a longer timeframe, *longitudinal studies* are the best choice (Zapf et al., 1996). They allow to analyse within-person as well as between-person effects and – if there are at least three waves of data – allow conclusions about indirect effects (Dormann et al., 2010). A temporal order in the variables is a necessary, albeit not sufficient condition for causality (Fischer et al., 2016). To establish causality more firmly, doing *experiments* would help and also considering and testing series of competing models in longitudinal studies (Hunter et al., 2007).

Last but not least, *qualitative research* can also help to advance the field, especially to explore new or detect unexpected phenomena (see Conger, 1998). Overall, the “right” methodological approach depends on the research question. As leadership operates at multiple levels, takes effect through mediators, is influenced by moderators and unfolds over time (Dinh et al., 2014) depending on context (Porter & McLaughlin, 2006) it is important to pay attention to levels of analysis, processes, temporal issues, and contextual factors.

2.7 Aims of this dissertation

With this dissertation, I would like to contribute to a better understanding of the processes linking constructive leadership in schools and teacher well-being by addressing the lacunae identified in the preceding chapters. In three studies, I examine different aspects of constructive leadership by the vertical leader and in Study II also shared leadership, test different processes on different levels and effects on a range of indicators of teacher well-being.

Specifically, Study I examines dual-level effects of transformational leadership and at the same time takes a contextual factor into account, namely principal’s span of control. The following research questions are addressed:

- Can individual- and group-focused dimensions of principals’ transformational leadership behaviour be empirically distinguished?
- Do individual-focused and group-focused transformational leadership differentially predict teacher and collective efficacy?
- Are the relationships between transformational leadership and teacher and collective efficacy dependent on principal’s span of control?

Study II focuses on constructive forms of vertical and shared leadership and looks at effects of these types of leadership in teachers’ daily work with these research questions:

2. Teacher well-being and constructive leadership

- Are constructive forms of vertical and shared leadership related to interaction quality and to teachers' pleasant affect and state work engagement in their daily work life?
- Is the effect of constructive forms of vertical and shared leadership on teacher's pleasant affect and state work engagement mediated via interaction quality?

Study III examines relationships over a longer timeframe, namely the relationship between leader support, team social resources, and work engagement by comparing three longitudinal models, with the aim of addressing the question:

- What is the best-fitting model representing the temporal order of effects between leader support, team social resources and work engagement?

Figure 1 depicts the conceptual model of this dissertation and Figures 2, 3 and 4 locate the three studies within this model.

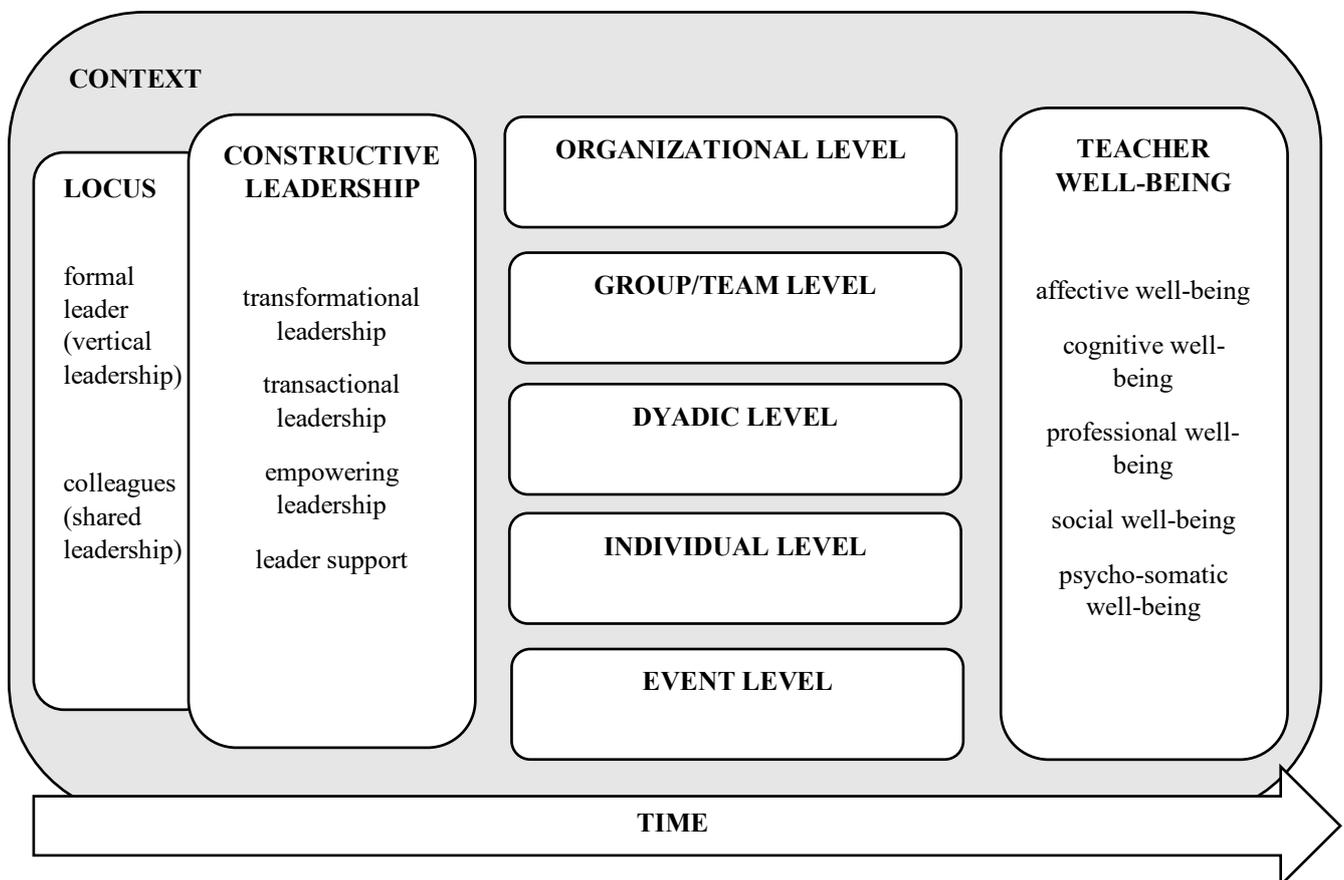


Figure 1. Conceptual model of this dissertation

3. Overview of studies

The three studies included in this dissertation (see Table 1 for an overview) focus on various facets of constructive leadership in schools and investigate different processes between leadership and indicators of teacher well-being. Because research designs have to be matched to research questions, each of the three studies is based on a different sample and analytic strategy.

3. Overview of studies

Table 1. Overview of the studies of this dissertation

	STUDY I	STUDY II	STUDY III
	Windlinger, R., Warwas, J., & Hostettler, U. (2020). Dual effects of transformational leadership on teacher efficacy in close and distant leadership situations. <i>School Leadership and Management</i> , 40(1), 64-87. https://doi.org/10.1080/13632434.2019.1585339	Windlinger, R., Hostettler, U., & Klumb, P. (under review). Effects of leadership in teachers' daily work life.	Windlinger, R., & Klumb, P. (in prep.). Effects of leader support on team social resources and work engagement: Comparing three longitudinal models.
Research design	cross-sectional study	diary study	three-wave longitudinal study
Analytical approach	doubly latent multilevel structural equation modelling (including moderator variable)	multilevel analysis (including test for indirect effect – mediation analysis)	cross-lagged panel analysis (longitudinal structural equation modelling)
Sample	1702 teachers in 118 Swiss public schools	1313 diary entries from 72 teachers in 15 Swiss public schools	684 employees from 113 extended education services in Switzerland
Leadership measure	transformational leadership (MLQ); individual-focused and group-focused dimensions	constructive vertical and shared leadership (transformational, transactional and empowering)	leader support
Process/Mediator	[self-concept: relational self, collective self] not modelled	interaction quality (support and satisfaction);	team social resources, work engagement
Outcome measure	teachers' individual and collective efficacy beliefs	pleasant affect, state work engagement	team social resources, work engagement
Theoretical background	transformational leadership, dual effects model, self-concept (relational, collective); contingency theories of leadership	vertical and shared leadership, affective events theory	conservation of resources theory, self-determination theory
Project / Funding	“School leadership practice, school context and school quality: A quantitative study of their relationship in the German-speaking part of the Canton of Berne”, Swiss National Science Foundation (SNSF; Program DORE # 13DPD3_136877)	“Leadership in schools”, Bern University of Teacher Education, PHBern, Switzerland, under Project Number 13 s 004 01	“Arbeitsplatz Tagesschule”, Bern University of Teacher Education, PHBern, Switzerland, under Project Number 15 s 0003 02

3.1 STUDY I – Dual effects of transformational leadership on teacher efficacy in close and distant leadership situations.

The first study (see Figure 2 for its location within the conceptual model of this dissertation) focuses on the effects of transformational leadership on teacher efficacy. It aims to overcome problems frequently associated with the conception and measurement of transformational leadership (e.g. van Knippenberg & Sitkin, 2013) by differentiating between individual-focused and group-focused transformational leadership. At the same time, we aimed at disentangling individual and group-focused effects of transformational leadership by focusing on outcomes at the two levels, that is individual and collective teacher efficacy. In addition, this study also considers contextual dependencies of leadership effects by examining the moderating role of the principal's span of control.

This study was based on a cross-sectional design. 1702 teachers from 118 Swiss public schools rated their principal's individual-focused and group-focused transformational leadership, as well as their individual and collective teacher efficacy. To analyse the moderated relationships between the two dimensions of transformational leadership and measures of individual and collective teacher efficacy we used multilevel regression models with doubly latent measures. This approach makes it possible to model effects of transformational leadership simultaneously on both levels of analysis while including span of control as a moderator variable and controlling for measurement and sampling errors.

Results show that the theoretically proposed dimensions of individual- and group-focused transformational leadership can be empirically distinguished, confirming evidence from non-school settings (Klaic et al., 2018; Tse & Chiu, 2014). Individual-focused transformational leadership behaviours (individualised consideration and intellectual stimulation) were related to individual teacher efficacy and group-focused transformational leadership (inspirational motivation and idealised influence) was related to collective teacher efficacy. Principals' span of control moderated the link between group-focused transformational leadership and collective efficacy, namely the relationship between these two constructs is stronger with smaller spans of control, i.e., in close leadership situations.

3. Overview of studies

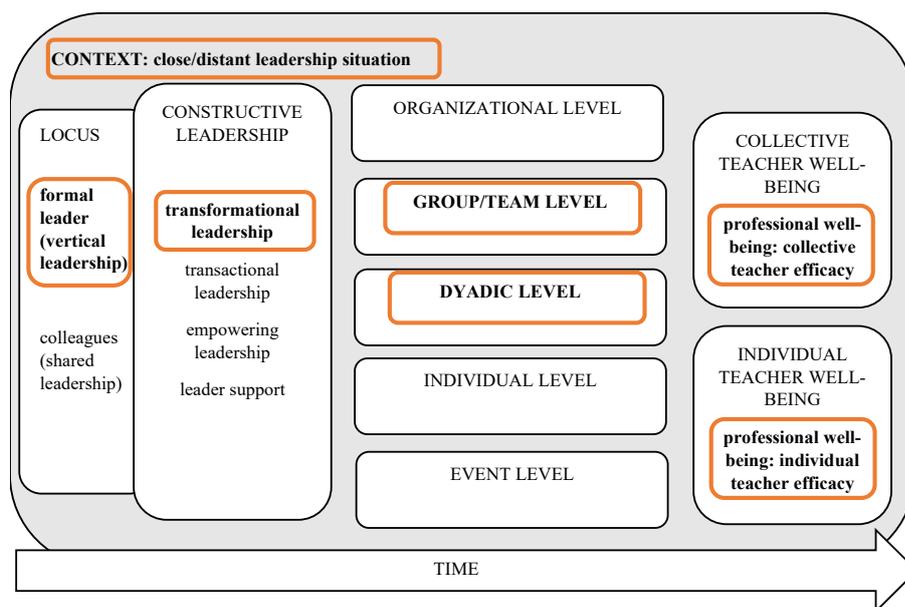


Figure 2. Location of Study I within the conceptual model of this dissertation

3.2 STUDY II – Effects of leadership in teachers’ daily work life

The second study extends the view on leadership by including a range of constructive leadership behaviours (transformational, transactional, and empowering leadership; see Figure 3 for the location of this study within the conceptual model of this dissertation). Furthermore, it considers that school leadership is not limited to the principal and therefore examines effects of vertical as well as shared leadership in teachers daily work life. We expected 1) constructive forms of vertical as well as shared leadership to be related to teacher well-being (state work engagement and pleasant affect) and 2) to interaction quality (experience of support and satisfaction with the outcome). Further, 3) interaction quality to be related to teacher well-being and that 4) the effect of vertical and shared leadership on teacher well-being to be mediated via interaction quality. To investigate the effects of leadership in teachers daily work life, we applied a daily diary design.

A sample of 72 teachers from 15 public schools filled in a baseline questionnaire which assessed to what extent teachers experience constructive vertical leadership by their principal and constructive shared leadership by their colleagues. Teachers then filled in a short questionnaire twice a day for ten working days. In these diary-type entries, they documented their current well-being and recorded their social interactions of the past half-day; more precisely, interactions that lasted 10 minutes or longer or were especially meaningful. Multilevel analyses and multilevel mediation models with multilevel structural equation modelling were performed in Mplus.

Teachers reported vertical as well as shared constructive leadership. Most of the interactions in their daily work life involved other teachers and only few interactions with the principal were documented. Results show that constructive vertical leadership is related to interaction quality and to pleasant affect and state work engagement. Furthermore, the effect of constructive vertical leadership on pleasant affect is mediated through satisfaction with the outcome of the interactions. Contrary to our expectations, we did not find any of the expected effects for constructive shared leadership. Apart from methodological explanations, a reason for not finding effects of shared leadership could be that shared leadership is more important for task-related outcomes than for well-being. The finding that teachers in schools with more pronounced constructive vertical leadership report more support in their interactions and are more satisfied with the outcomes of the interactions suggests that the team climate in such schools is better, as most interactions do not involve direct contact with the principal.

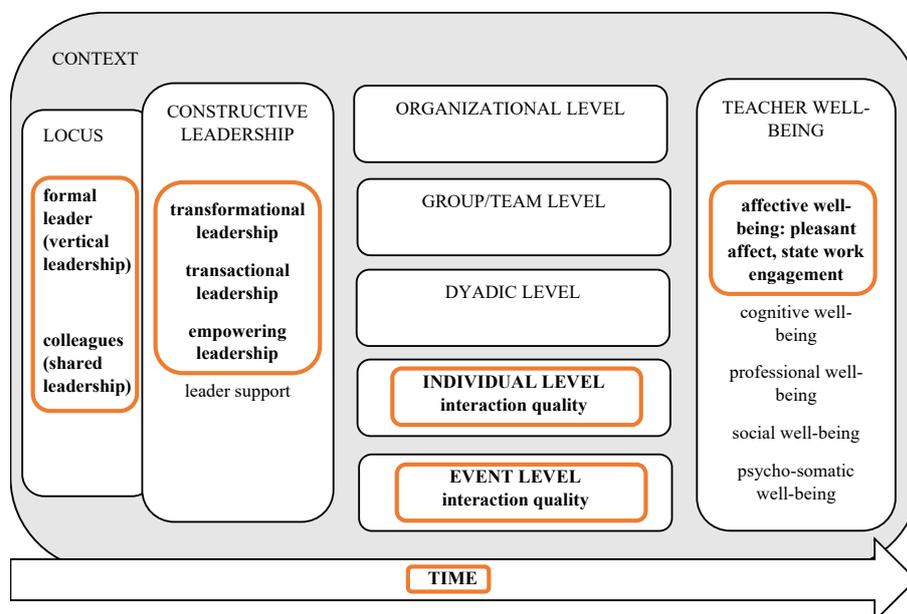


Figure 3. Location of Study II within the conceptual model of this dissertation

3.3 STUDY III – Effects of leader support on team social resources and work engagement: Comparing three longitudinal models.

The aim of the third study was to better understand the temporal order of effects between leadership, team social resources and work engagement (see Figure 4). To this end, we compared three different process models of the effects of leader support on team social resources and work engagement. In the first model, leader support is positively related to individual work engagement and work engagement, in turn, influences team social resources. The second model proposes a different order of effects, namely an effect of leader support on team social resources and subsequent effects of team social resources on work engagement. The third model includes parallel

3. Overview of studies

effects of leader support on both variables and a gain cycle between work engagement and team social resources.

This study applied a three-wave longitudinal design to test the competing models with a sample of 684 employees from 113 extended education services in Switzerland. Participants completed questionnaires at three measurement occasions separated by lags of 6 months. The models were analysed with longitudinal structural equation modelling in Mplus. The results did not reveal any evidence for cross-lagged effects between the variables over the time lags of 6 months. All three variables (leader support, team social resources, work engagement) showed high stabilities over time. Post-hoc exploratory analyses suggest that the time frame of effects might be quite short and may have been missed by the long follow-up intervals. Future studies should consider carefully which time intervals are suited for the phenomenon of interest.

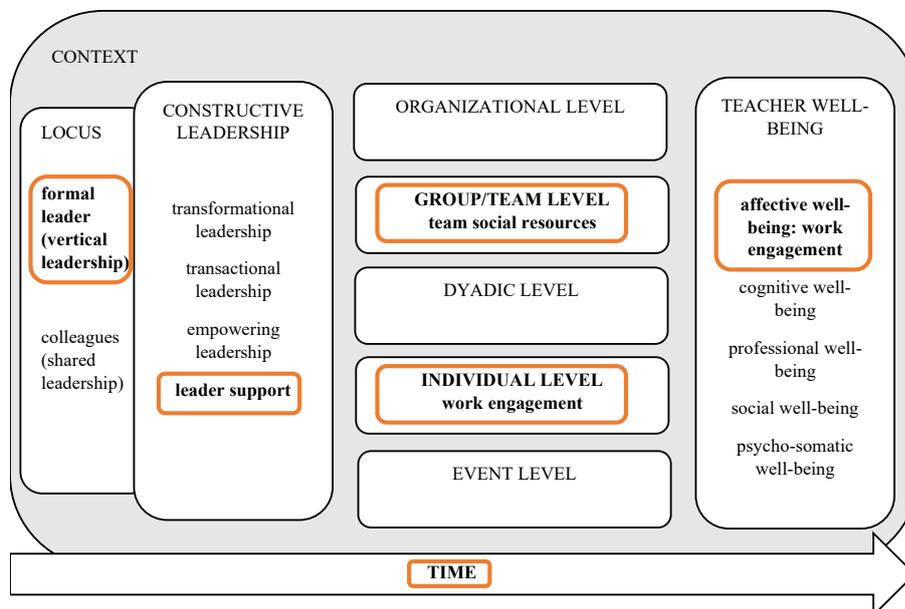


Figure 4. Location of Study III within the conceptual framework of this dissertation

4. General Discussion

The aim of this dissertation is to examine different aspects of constructive leadership in schools and investigate processes linking leadership with teacher well-being and thereby addressing several gaps in the extant literature on this topic. In this chapter, I first discuss the main findings of the three studies and the theoretical contributions of these results. Furthermore, I address open questions for future research (Chapter 4.1). Afterwards, I point out practical implications of the research findings for leadership and teacher well-being in schools (Chapter 4.2), then analyse the strengths and limitations of my work (Chapter 4.3), before formulating general conclusions (Chapter 4.4).

4.1 Main findings, theoretical contributions, and future research

The discussion of main findings is organized around the different conceptions of leadership (4.1.1) and the processes connecting leadership with teacher well-being (4.1.2).

4.1.1. Vertical and shared leadership

The three studies examined different facets of constructive leadership in schools. Study I focused on principal's transformational leadership, Study II included transformational, transactional, and empowering leadership behaviours by the principal (vertical leadership) as well as by the colleagues of the teachers (shared leadership), while Study III focused on leader support. Overall, teachers reported experiencing these types of constructive leadership in their schools. In Study I, principals exhibited transformational leadership behaviours fairly often, this was the case for individual-focused as well as group-focused transformational leadership. There were differences between schools in teachers' shared perceptions of leadership, indicating that principals differ in the extent they use transformational leadership behaviours. Relatively high levels and differences between schools were also found for the perception of constructive vertical leadership (Study II) and leader support (Study III). On the other hand, whereas teachers did report experiencing constructive shared leadership (Study II) by their colleagues, teachers belonging to the same school did not converge in their assessment/perception of shared leadership, i.e., there were no systematic differences between schools regarding shared leadership.

Furthermore, even though teachers did report experiencing shared leadership at their workplace, shared leadership was neither related to interaction quality nor to indicators of teacher well-being in our sample (Study II). As we discussed in the respective section of the study, this could be due to several reasons. First, shared leadership (in the way we conceptualized and measured it) has so far mostly been assessed in teams (Zhu et al., 2018). While the participating teachers worked in the same schools, that does not necessarily mean they worked in the same team. Different teams (e.g., teachers who teach the same subject or the same class) in a school could differ with respect to the

4. General discussion

kind and degree of shared leadership. Second, it is possible that shared leadership matters more for team effectiveness or task-related outcomes and less so for well-being. There are studies that support this assumption (e.g. Tafvelin, Hasson, et al., 2019) but also others that show that shared leadership is more strongly related to attitudinal (e.g. job satisfaction) and behavioural outcomes (e.g. cooperation) than to performance (D. Wang et al., 2014). Third, shared leadership could depend on the actual situation and the current tasks, i.e., fluctuate in a dynamic way, so that there is no characteristic “style” of shared leadership teachers generally experience. If this is the case, we can only find effects on teachers’ daily interactions, their pleasant affect and state work engagement if we measure shared leadership on a daily level (Kelemen et al., 2020).

These considerations show that many questions remain open regarding shared leadership and its relationship with teacher well-being. Therefore, it is difficult to draw any conclusions yet. Future research needs to study shared leadership in teams that are embedded in the school and that have shared goals and a certain degree of interdependence between team members (Bisbey & Salas, 2014; Vangrieken et al., 2013). Further, important insights could come from different ways of measuring shared leadership, such as examining daily shared leadership behaviours and their link with daily interactions and well-being or identifying patterns of interactions with a social network approach and linking it to teacher outcomes.

It is a cumbersome issue in school leadership research, that despite the popularity of collectivistic approaches to leadership, there is little agreement on their definitions. For example, a recent meta-analysis about distributed leadership (Tian et al., 2016) shows that a universal definition is still missing, while two reviews on teacher leadership conclude that there is still a lack of robust research (Wenner & Campbell, 2017) and definitions of teacher leadership are still varied, which leads to differences of interpretation (Nguyen et al., 2020). Nevertheless, different conceptions of these shared types of leadership converge in their view of extending the roles and responsibilities of the teachers, beyond teaching in their classroom (Seashore Louis et al., 2009). This includes teachers’ involvement in processes concerning the whole school, their taking part in decision making and a stronger collaboration between staff (Muijs, 2011). This leads us back to the formal leader and his/her role in creating conditions, in which leadership can be shared (Friedrich et al., 2016), such as by empowering teachers and delegating authority (Sebastian et al., 2016). These processes connecting the school principal’s empowering or participative leadership behaviours and the development of shared leadership in schools should be studied as they unfold over time, in future research (Edelmann et al., 2020).

4.1.2. Processes on different levels

As the aim of this dissertation was to examine different ways of how constructive leadership affects teacher well-being, all three studies focused on processes. Taken together, the results show

that different types of constructive vertical leadership in schools are related to different aspects of teacher well-being through different processes. In Study I, we examined processes connecting individual-focused and group-focused transformational leadership with teacher efficacy. With the aim of clarifying some issues that have been raised regarding transformational leadership and its conceptualization and operationalization (Berkovich, 2016; van Knippenberg & Sitkin, 2013), we showed in Study I that individual-focused and group-focused transformational leadership behaviours can be distinguished conceptually as well as empirically. These results contribute to a clearer picture of transformational leadership in schools and can serve as a basis for future research on its effects. Further, our results link transformational leadership with teacher efficacy in a dual-level model.

Individual-focused transformational leadership behaviours such as recognizing followers as individuals with specific strengths and weaknesses and supporting their development (individualised consideration), and encouraging followers to be creative and try out new ways of tackling problems (intellectual stimulation; Bass, 1999) prime the followers' relational self and stimulate their identification with the leader. Followers who strongly identify with the leader are motivated to complete challenging tasks and feel empowered (X.-H. Wang & Howell, 2012). Our results showed that individual-focused transformational leadership was related to individual teacher efficacy, the beliefs of a teacher regarding his/her ability to successfully deal with the professional demands related to teaching and to influence student outcomes (Klassen & Tze, 2014). Even though differences in teachers' perceptions of their principal's individual-focused transformational leadership within schools were related to individual teacher efficacy, this link only accounted for a very small part of interindividual differences in teacher efficacy within schools. Effects were mainly found between schools, such that the more a principal is consistently seen by the teachers to provide individual-focused transformational leadership the higher, on average, were teachers self-efficacy beliefs.

Group-focused transformational leadership behaviours, such as role modelling desirable behaviour (idealised influence) and emphasizing shared goals (inspirational motivation; Kark & Shamir, 2013) prime followers' collective selves and through this process their motivation to contribute to group objectives. Group-focused transformational leadership was positively linked to collective efficacy, the shared perception of the group regarding its capabilities to deal with school- and teaching-related challenges and have a positive effect on student learning (Goddard et al., 2004). This effect was moderated by principals' span of control, that means that the association between group-focused transformational leadership and collective efficacy is stronger the closer the leadership situations.

4. General discussion

Overall, these results of Study I confirmed the hypothesized dual-level effects of transformational leadership on individual and collective teacher efficacy. We assumed that this process is mediated by affecting different aspects of followers' self-concept, but we did not actually test this process. Other studies have shown such a mediator effect though (X.-H. Wang & Howell, 2012). Future research should extend the investigation of dual effects of transformational leadership with a longitudinal design. This would allow to properly examine the mediating identification processes and to test how individual teacher efficacy and collective efficacy relate to each other over time.

Study II took a perspective that is quite rare so far in school leadership research, in that it focused on processes in teachers daily work life. The rationale behind this is that if leadership has an effect on teacher well-being, then this must be visible in teachers' daily work life. Further, by measuring experiences in daily life we could avoid retrospective bias that can occur when past experiences are assessed globally. The results of Study II show that constructive vertical leadership is related to interaction quality and affective well-being. Teachers in schools where the principal was rated higher on constructive leadership reported a) better interaction quality in terms of feeling supported by their interaction partner and satisfaction with the outcome of the interaction and b) higher levels of state work engagement and pleasant affect in their daily work life. The effect of leadership on pleasant affect was mediated via satisfaction with the outcome of the interactions at work.

The results of this study therefore elucidate one of the processes of how leader behaviours affect teacher outcomes, namely via the quality of social interactions at work. Mostly the interaction partners were other teachers and only very few direct interactions with the principal were recorded. Hence, the principal seems to have an influence on the organizational culture of his/her school, which is characterized by "norms of emotional expression and rules governing social interactions between organizational members" (Ashkanasy & Humphrey, 2014, p. 796). It is worth noting that the relationship between constructive vertical leadership and state work engagement was not mediated by interaction quality. There could be other mediators in this relationship, for example resources such as skill variety, feedback or autonomy (Breevaart, Bakker, & Demerouti, 2014; Breevaart, Bakker, Hetland, et al., 2014).

To find out how leadership relates to resources at the team level, such as a friendly climate and mutual support and to work engagement over a longer timeframe, we tested three competing longitudinal models in Study III. Despite the abundance of research that examined antecedents of work engagement in the last two decades (Lesener, Gusy, Jochmann, & Wolter, 2019) the processes between leadership, team social resources, and work engagement are not yet well understood, as conclusions about indirect or reciprocal effects were not possible with cross-sectional designs or longitudinal designs with a two-wave design. Of the three models we compared, the first proposed effects of leader support on work engagement and effects of work

engagement on team social resources. The second model suggested effects of leader support on team social resources and of team social resources on work engagement. The third model assumed effects of leader support on both variables, plus a reciprocal relationship between team social resources and work engagement over time. There was no evidence for cross-lagged effects in any of the models, that means we did not find effects of leader support on teacher work engagement or team social resources over the time lags of six months. However, our post-hoc analyses revealed synchronous effects. These synchronous effects indicate that an increase in leader support has an immediate positive effect on work engagement and on team social resources, and an increase in team social resources has an immediate effect on concurrent work engagement.

Overall, the results of the three studies show that constructive vertical leadership in schools is related to different dimensions of teacher well-being, including fluctuating affective states such as pleasant affect and state work engagement, and more stable experiences like teacher efficacy and work engagement, through dyadic interactions of the principal with each follower, through leader-group interactions as well as indirectly, via interaction quality and team social resources. The results highlight that apart from dyadic relationships with each teacher, principals' communication with and behaviour towards the teaching staff as a whole is important. Further, principals' leadership behaviours affect characteristics of the workplace, such as the school climate, which shapes the way teachers interact and collaborate. This is important, as some principals have very high spans of control and dyadic interactions with each individual teacher are rare because of time constraints.

Future studies should try to shed light on the ways in which principals influence the school climate or more generally the working environment in the school. Promising approaches for this could be to study schools at times when a new principal takes over (before the takeover, during and at several times afterwards), as changes in school climate are quite likely to be observed in such phases (Meyer et al., 2009). Apart from this, we could gain more knowledge through recording or observing all interactions the principal has with his/her staff, including very short informal exchanges but also occasions, when he/she addresses all teachers, e.g., in meetings. Achieving a better understanding of how principals positively influence the school culture and the collaboration between the teachers is the basis for deriving how principals can be supported in contributing to a good working environment in schools. Schools as "special organizations" need shared goals and shared meaning for the teachers as well as teacher participation and collaboration to achieve high-quality outcomes. At the same time, a positive work environment with high interaction quality and good team resources benefits teacher well-being. A better understanding of this could help to further clarify communalities and distinctions between teacher collaboration, teacher involvement in processes concerning the whole school, and collectivistic approaches to leadership.

4.2 Practical implications

From the results of the three studies, implications for improving leadership and teacher well-being in schools can be derived. First, as the results of the present research show that constructive school leadership is related to teacher well-being, this highlights the importance of leadership training. Principals usually have a background as a teacher and then get training targeted at different stages of school leadership, such as pre-service training, induction programmes and continuing education (Pont et al., 2008). All of these programs can improve constructive leadership skills of principals. There is meta-analytic evidence that overall leadership training is effective, in such a way that it improves perceptions of utility and satisfaction, learning, the transfer to the job and outcomes on the level of the organization and the followers (Lacerenza et al., 2017). In addition to this, Kelloway and Barling (2010) conclude in their review, that leadership development is an effective intervention for employee well-being. Regarding the design of leadership training programs, the above-mentioned meta-analysis (Lacerenza et al., 2017) shows best practices, such as conducting needs analyses or using multiple delivery methods (see also Daniëls et al., 2019; Muijs, 2011 on effective leadership development in schools). In addition to developing leadership skills with a variety of methods, it is also important that principals understand the ways how leadership can affect teacher well-being, and how teacher well-being is further related to student outcomes. It is important that principals understand their role in shaping and supporting a positive work environment for their staff. This understanding should help principals guide and prioritize their actions.

Second, the studies of this dissertation show that team processes such as receiving support, experiencing positive social interactions, and other team social resources play an important role for teacher well-being. While school leadership has an influence on such team social resources, there are other factors that influence the type and quality of interactions and collaboration of teachers. These factors can be personal characteristics of the teachers such as attitudes towards teamwork, structural characteristics such as having ample space and time for collaboration, group characteristics such as teaming skills, process characteristics such as interdependence and organisational characteristics such as administrative support (Vangrieken et al., 2015). Some of these factors, especially personal characteristics of the teachers and the group, can be influenced by teacher education and professional development. Other factors, such as structural, process or organizational characteristics can be affected by stakeholders, policymakers or educational authorities when decisions are made regarding school organisation, infrastructure, curriculum development or implementation of school reforms. It is important that such decisions are made with the intent to facilitate and support teacher collaboration. At the same time, collaboration should not be forced (Muckenthaler et al., 2020) and there needs to be a good balance with teacher autonomy (Kelchtermans, 2006).

Third, the present research emphasizes the importance of school leadership, hence, attention should be paid to school leaders' working conditions and their health. Just like teachers, principals need to be in good health and experience well-being to do their work well. That means, that they need adequate resources such as time (paid working hours), role clarity, autonomy, and support from their superiors (school board, local authorities) as well as professional support such as coaching (Pont et al., 2008). Leading well depends on the leader's resources (Tafvelin, Nielsen, et al., 2019) and leaders who experience well-being are more likely to use constructive leadership behaviours (Kaluza et al., 2020).

4.3 Strengths and limitations

The three studies of this dissertation all have specific strengths and limitations that are mentioned in the respective discussion sections. Here, I focus on overall strengths and weaknesses of the dissertation. A first strength of this dissertation is the combination of different research designs to study the topic from different perspectives. Study 1 used a cross-sectional design with a big sample, which is well suited to investigate whether individual- and group-focused dimensions of principals' transformational leadership behaviour can be empirically distinguished. Further, the multilevel modelling approach with doubly latent measures allows for simultaneous estimations of the relationships with teacher efficacy on both levels while controlling for measurement and sampling errors. Study II used a daily diary design, which has the advantage of getting close to teachers' daily experiences and find out how these daily experiences are related to fluctuations in well-being. Further, the perception of leadership can be linked to the aggregation of such experiences in daily work life and in this way intra- and interpersonal approaches can be combined. Finally, Study III, a cross-lagged panel study with a three-wave longitudinal design allows to properly analyse relationships between the variables over time and compare three different models proposing the three potential temporal orders of processes over time.

A second strength is the focus on processes and at the same time taking into account the multilevel nature of leadership, as has been advocated by researchers for leadership research in general (e.g. Dinh et al., 2014; Fischer et al., 2016) and for research on leadership and well-being specifically (e.g. Montano et al., 2017). In the three studies we did not only connect leadership with outcomes, but also studied mediators that link leadership and outcome variables. Processes on different levels were taken into account theoretically but also modelled properly by using multilevel modelling and (latent) aggregation of group constructs. In addition to this, study III also compared different temporal orders of processes.

A third strength is the inclusion of shared leadership, following calls to study not only leadership influence from the formal leader but from all potential sources (Yammarino et al., 2012). This is important, as collectivistic approaches to leadership are quite popular in the literature on school

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leadership, but they have rarely been related to teacher well-being, so far. Even though our results regarding shared leadership and teacher well-being (Study II) remain inconclusive, we found that teachers do experience constructive shared leadership by their colleagues and deduced suggestions for the design of future studies (see Chapter 4.1.1).

A major limitation concerns the conception of leadership solely as an antecedent of processes and outcomes. We neither considered situational constraints apart from leader span of control in Study I nor reciprocal relationships with other variables. Leaders “do not operate in a vacuum” (Nielsen & Taris, 2019, p. 112) and the situation they are in, features of their working environment but also personal resources all affect their options and their ability to lead constructively. Even the followers can be seen as such an aspect of the working environment, making it easier or harder for the leader to lead constructively (St-Hilaire et al., 2018). Consequently, we can assume that there are reciprocal relationships between leader behaviours and other variables we measured, such as team social resources or work engagement. While there are already some studies that have shown such reciprocal relationships (e.g. van Dierendonck & Dijkstra, 2012), more research is needed that models leadership and followership as a dynamic process.

Another limitation of this dissertation is connected to the issue of time. If we understand leadership as a process, then this must involve time, as processes unfold across time spans. These time spans can range from seconds to years (Dinh et al., 2014). As with many leadership studies, Study I did not explicitly take time into account. Study II took time into account insofar as we used a daily diary which is a type of interval-based sampling (Ohly et al., 2010) and looked at events that happened on different (half-)days. Study III attempted to properly incorporate time into its design with its three-wave design with a time lag of 6 months. The fact that we did not find any cross-lagged effects but only synchronous effects in the post-hoc exploratory analyses suggests that the timeframe of the effects could be shorter than six months. This points to the fact that we need more knowledge about temporal dynamics of leadership and organizational processes (Griep & Hansen, 2020) so that we can plan studies and set measurement occasions more purposeful (McCusker et al., 2018). To this end we need reviews about the timing of processes (e.g. Mäkikangas et al., 2016) and beyond that, theoretical models that integrate a temporal perspective that does not only specify the temporal order of processes but also the timeframes in which these processes develop (Dormann & van de Ven, 2014; Sonnentag, 2012). Generally, a fruitful approach seems to be to combine different timeframes to further study the influence of leadership on teacher well-being as different processes on different levels likely unfold in different timeframes and influence each other (Lord, 2018; Xanthopoulou et al., 2020). There are processes that unfold in short timespans, which we can capture with diary designs and processes such as the emergence of an organizational climate that take longer and need longitudinal designs with more dispersed time points (Dinh et al., 2014). Hence, an ideal approach that combines both are measurement bursts (e.g. Sliwinski, 2008).

Finally, leadership in all three studies was measured with self-report questionnaires, which assess subordinate perceptions of leader behaviours globally. The accuracy of such ratings can be influenced by beliefs about the leader (Hunter et al., 2007), follower internal psychological processes or contextual factors (Hansbrough et al., 2015). That means that leader behaviour and leadership perception processes are confounded (Dinh et al., 2014). This problem was alleviated in studies I and II, where vertical leadership was assessed with aggregated ratings, i.e., teachers' shared perceptions regarding their principal's leadership. All the same, to get a more objective assessment of leadership behaviours, actual observations could be used or recordings of principals' time allocation to different tasks (Sebastian et al., 2018). If we are interested in effects of specific leadership behaviours on a daily basis rather than a more global assessment, then daily diaries are suited well (Kelemen et al., 2020).

4.4 General Conclusion

Teachers have a very important role in and for the lives of our children. To do a good job in their meaningful, rewarding but also challenging occupation, teachers need to be well. One important factor for teacher well-being is leadership in schools. The aim of this dissertation was to contribute to a better understanding of the processes linking constructive leadership in schools and teacher well-being.

The results of the three studies of this dissertation show that constructive vertical leadership in schools is related to different dimensions of teacher well-being and that there are different processes that can help explain this relationship. Principals' individual-focused transformational leadership behaviours, which they show in dyadic interactions with their followers, are related to teachers' individual self-efficacy, while group-focused transformational leadership behaviours are aimed at the collective and are linked to collective efficacy beliefs of staff members. Teachers in schools that are led by a principal with more pronounced constructive leadership experience higher interaction quality in their daily work life and higher levels of pleasant affect and state work engagement. Further, leader support is related to concurrent team social resources and work engagement.

The results highlight the importance of constructive vertical leadership in schools for teacher well-being. This indicates that school principals need to be trained and supported well and have sufficient resources in order to lead constructively. The results also lead to suggestions and starting points for future research, which should aim at further clarifying the concept and effects of shared leadership and in addition find out more about how principals influence school climate and social interactions between teachers.

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6. Full-lengths manuscripts

6.1 Study I

*This is an Accepted Manuscript of an article published by Taylor & Francis in School Leadership & Management on 05 March 2019, available online:
<https://doi.org/10.1080/13632434.2019.1585339>*

Dual Effects of Transformational Leadership on Teacher Efficacy in Close and Distant Leadership Situations

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This work was supported by the Swiss National Science Foundation (SNSF) under grant #136877 (<http://p3.snf.ch/project-136877>).

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Abstract

Although research generally attests to the beneficial role of transformational leadership (TL) for school effectiveness, little empirical work has distinguished individual- from group-focused dimensions of TL and analysed their relationships with target variables at the individual and group level of followers simultaneously. Using a dual effects model of TL, the present study aims to fill this gap. It examines the dimensional structure of principals' TL behaviours and their prognostic value for teachers' self- and group-referential efficacy beliefs. Additionally, contextual dependencies of leadership effects are considered through the moderating role of a principal's span of control. Based on questionnaire data of 1,702 teachers in 118 Swiss schools, doubly latent ML-SEMs specify moderated dual effects of TL on both teacher and school levels of analysis. Results convey empirically separable latent sub-dimensions of TL (individual-/group-focused), which (a) characterize systematic differences in the leadership behaviours of the investigated principals and (b) substantially predict variations in the mean-levels of both teacher and collective efficacy between their respective schools. TL-collective efficacy relations are stronger in close leadership situations (low span of control) than in distant ones.

Keywords: dual effects of transformational leadership, teachers' individual and collective efficacy beliefs, close/distant leadership situations, multilevel analysis

Dual effects of transformational leadership on teacher efficacy in close and distant leadership situations

Transformational leadership (TL) shapes teachers' professional attitudes, practices, and outcomes in various ways, thereby indirectly affecting student achievement (e.g. Chin, 2007; Leithwood & Sun, 2012). Sun and Leithwood (2017, p. 88) have demonstrated that the greatest payoff for students comes from principals' efforts to enhance staff members' collective efficacy. Thus, strengthening teachers' confidence in their professional abilities to support student learning presents an essential target variable of leadership in schools. However, meta-analytical findings point to marked variations in effect sizes among studies (e.g. Hendriks & Scheerens, 2013; Marzano et al., 2005). Robinson et al. (2008) rightly propose that these variations partially stem from heterogeneous *operational* definitions of TL. By comparing effect sizes of narrow but substantially consistent *subdimensions* in different measures of leadership, the authors demonstrate that decomposing rather broad leadership measures into distinct behavioural facets reveals more converging findings.

From a social-psychological perspective, most studies of TL in educational settings ignore that different TL dimensions appeal to different types of self-construal in followers. They do not consider the 'dual effects' that unfold through the *dyadic* interactions of leaders with team members, as well as through *leader-team* interactions (Kark & Shamir, 2013). Instead, most studies apply a single-factor measure of TL, that is, a composite score of TL that merges items of all subdimensions into one average value. Irrespective of the question whether the single-factor approach reflects a deliberate decision of the authors or an inevitable consequence of prior factor analyses, it implies that TL enters empirical investigations as a monolithic construct. This composite score is

then used either at the level of the individual teacher, or aggregated at the team level in order to quantify associations with target variables that themselves represent either (*disaggregated*) scores for each staff member or *aggregated* constructs for an organisational entity (X.-H. Wang & Howell, 2010). Thus, a lack of conceptual distinction is aggravated by methodological oversimplification, overlooking the fact that leadership operates at multiple levels (Chun et al., 2009). We propose that scientific knowledge of the nature and effects of school principals' TL would benefit from consistent theoretical and empirical differentiation between individual and team levels of analysis.

A further shortcoming of numerous studies is their neglect of leadership context. Contextual dependencies figure prominently in *contingency theories* of leadership (c.f. Porter & McLaughlin, 2006) as well as in research into principals' options, constraints and choices of action (e.g. Brauckmann & Schwarz, 2015). Therefore, it is critical to consider school-specific conditions that may enhance or reduce the presumed positive consequences of principals' TL behaviours on teachers' professional attitudes or practices (Hallinger, 2011). Conditions belonging to the *external context* of the school cover features of the institutional, community, socio-cultural, political, economic or school improvement context (Hallinger, 2018). Conditions belonging to the *internal context* include features of organisational culture and goals, or of work processes and structure (Porter & McLaughlin, 2006). From the multitude of such conditions, we examine principals' span of control,¹ because an increase in staff numbers per principal reduces

¹ While span of control is related to, it is not a simple function of school size. Wherever there is a middle-management layer, the principal's span of control (as indicated by the number of direct subordinates) can be rather small even in large schools. Here, leader-follower-interactions refer to interactions with a modest number of middle-management teachers and, thus, to a close leadership situation with these interaction partners. Therefore, it is difficult to draw on empirical

staff members' opportunities to interact with and observe their supervisor (Schyns et al., 2012). A large span of control thus indicates a distant leadership situation (Chun et al., 2009), and, given that TL primarily operates through social interaction (Kark & Shamir, 2013), a distant situation might diminish the leader's impact on followers (Gumusluoglu et al., 2013).

Against this background, we aim to *conceptually* distinguish mechanisms and proximal targets of principals' TL behaviours at both the individual- and group-level within schools, thereby focusing on teachers' individual and collective efficacy beliefs; *empirically* examine the structural validity of the assumed model of distinct TL dimensions and their associations with individual or collective efficacy; investigate whether TL effects are contingent on a principal's span of control.

We employ multilevel regression models with doubly latent measures to test moderated relationships of TL dimensions with individual and collective efficacy beliefs among staff. This allows simultaneous estimations of TL effects on both levels of analysis, while controlling for measurement and sampling errors and testing if these effects differ across or within the schools investigated.

The 'Dual' Operating Principles of TL and their Relevance for Teachers' Efficacy

Beliefs

A Basic TL Model and Established Strategies to Test It

Transformational leaders seek to change the attitudes, beliefs and values of followers in order to stimulate working activities that ensure sustained organisational development (Bass & Riggio, 2006). They exert influence by "heightening followers'

evidence about school size. Moreover, related research mostly focuses on student learning, which is a qualitatively different outcome variable than teacher efficacy.

self-awareness, instilling a sense of purpose and mission in followers, and influencing them to transcend lower-order motives for the sake of the long-term benefit of the group to which they belong” (Hoffmann et al., 2011, p. 780). As a consequence, staff members perceive their personal aims and values to be highly congruent with those of the organisation, and feel strongly committed to them (Avolio et al., 2004; Ross & Gray, 2006b). Four complementary TL dimensions are proposed to establish these connections (Bass & Riggio, 2006). *Idealised influence* implies that the leader functions as a role model for integrity, inventiveness, persistence, reliability, and courage, and receives followers’ appreciation and admiration for possessing such traits. *Inspirational motivation* pertains to communicating clear expectations and attractive visions of the organisation’s future with enthusiasm. *Intellectual stimulation* refers to encouraging followers to question established assumptions and routines, to be creative and to try out new ways of thinking and problem-solving. *Individualised consideration* indicates that a leader acknowledges followers as individuals with different strengths and weaknesses, is attentive to their respective needs and supports their professional development.

In educational settings, TL shows largely consistent relationships with student achievement with significant but small effects on average (Chin, 2007; Leithwood & Sun, 2012; Marzano et al., 2005). These effects are likely mediated by a range of school and teacher characteristics (Hendriks & Scheerens, 2013). Indeed, schools led by discernibly transformational principals convey shared goals, productive work environments, instructional improvements, strong organisational cultures, and shared decision-making to greater degrees than other schools. Teachers in such schools report higher job satisfaction, stronger organisational commitment, and increased efficacy beliefs. Moreover, principal TL explains variations in teachers’ professional practices, such as classroom

management, use of knowledge or organisational citizenship behaviour (Leithwood & Sun, 2012).

To investigate the link between principals' TL and staff's efficacy beliefs in particular, researchers employ measures of individual *teacher efficacy* and *collective efficacy*. Since the concept of perceived efficacy describes the future-oriented, *domain-specific* beliefs a person holds regarding his or her "capacity to organize and execute the courses of action required to produce given attainments" (Bandura, 1997, p. 3), efficacy beliefs among teachers pertain to coping successfully with the professional demands of enhancing students' academic progress and personal growth (Klassen & Tze, 2014). However, these beliefs can draw on either individual or group capabilities to master these demands (Ware & Kitsantas, 2007). Consequently, self-referential efficacy beliefs (*teacher efficacy*) connote each staff member's expectation that "he or she will be able to bring about student learning" (Ross & Gray, 2006b, p. 182), whereas group-referential efficacy beliefs (*collective efficacy*) reflect teachers' shared perceptions of their conjoint capability to foster student learning through concerted actions (Goddard et al., 2004). Collective efficacy represents an emergent *organisational property* that is far more varied than teacher efficacy between schools. Thus, it is never adequately reflected in a sum or average of the *self-referential* efficacy beliefs of single staff members, but rather integrates staff members' assessments of their *group capabilities* (Ware & Kitsantas, 2007).²

However, all studies of which we are aware used a single-factor measure of TL (i.e., composite score of TL items), and mostly applied a single-level approach to test its

² It should be noted that simply replacing the referent category "I" by "We" in questionnaire items is not sufficient. To receive genuine ratings of collective efficacy, the items should focus on group capabilities to master professional demands that require concerted actions, such as implementing school improvement projects.

assumed association with target variables (= basic model design, see Figure 1). More precisely, most studies aligned the level of measurement for TL with the level of measurement implied by the selected efficacy concept. They examined how TL relates to

- staff's *collective efficacy* with all measures aggregated to the school level (Dussault et al., 2008; Ross & Gray, 2006a, 2006b);
- individual *teacher efficacy*, either with all measures reflecting individual perceptions of staff members (Runhaar et al., 2010), or with measures aggregated entirely to the school level (Nir & Kranot, 2006);
- both *teacher and collective efficacy* by adjusting all measures and analyses to the individual level (Demir, 2008) or by aggregating measures of TL and collective efficacy to the school level and running statistical analyses at the individual level (Kurt et al., 2011).

Disentangling Individual- and Group-Focused Effects of TL

The dual effects model of TL (Figure 2) assumes two latent sub-dimensions of leadership behaviours that target different recipients and enable a transformational leader to address a single follower (*individual-focused TL*) as well as to influence an organisational unit as a *whole* (*group-focused TL*; Kark & Shamir, 2013; Tse & Chiu, 2014; X.-H. Wang & Howell, 2010). Drawing on social-psychological theories of self-construal, the model proposes dual but parallel operating principles of TL, affecting different aspects of staff members' self-concept (Epitropaki et al., 2017). Individual-focused leadership behaviours prime *the relational self* of followers and facilitate their identification with the leader. Perceived qualities of the relationship with this significant other become self-defining. Therefore, demonstrating appropriate role behaviour is conducive to self-worth. Group-focused leadership behaviours activate the *collective self* of followers, thereby fostering identification with the group. Hence, self-worth increases

through contributions to the attainment of collective goals (Cole et al., 2009; Kark & Shamir, 2013, p. 93).

Constitutive Elements of Individual-Focused TL

Leadership behaviours that prime the relational self of followers comprise *individualised consideration* and *intellectual stimulation*. As described, *individualised consideration* means paying attention to person-specific strengths, weaknesses, and requirements, and supporting each staff member like a coach or mentor. The leader delegates tasks that are challenging but not excessive to provide learning opportunities and empowerment. Thus, by granting *individualised consideration*, the leader contributes greatly to an appreciative and trustful relationship with each follower (Tse & Chiu, 2014). *Intellectual stimulation* refers to encouraging staff members to be adventurous, inventive and creative in handling tasks (Bass & Riggio, 2006). By helping to break up rigid routines or find effective ways of tackling new problems, the leader supports each follower to realise his/her full potential and raises his/her conviction of bearing all of the capabilities required to meet high professional demands (X.-H. Wang & Howell, 2010). Taken together, individual-focused TL behaviours “transmit the message that the leader believes in the follower and has high confidence in his integrity and ability” (Kark & Shamir, 2013, p. 93).

Constitutive Elements of Group-Focused TL

Leadership behaviours that aim at the group as a whole and raise the salience of collective selves among its members contain *idealised influence* and *inspirational motivation*. Leaders who exert *idealised influence* make sacrifices for the benefit of the group, thereby setting a visible personal example. Their communication and decision-making emphasise similarities among group members and accentuate group affiliation and coherence, for example when pointing out shared values and the group’s uniqueness

(Kark & Shamir, 2013; X.-H. Wang & Howell, 2010). *Inspirational motivation* arises by conveying appealing visions of the group's development while revealing promising paths for their realisation through joint efforts. The leader thus expresses confidence in the team's collective ability to attain its goals, and encourages and facilitates collaboration (Goddard et al., 2004; Walumbwa et al., 2004).

Principals' Span of Control as a Moderator of TL-Efficacy Relations

In spite of substantial support for TL's dual operating principles from studies in non-educational settings (Tse & Chiu, 2014; Wu et al., 2010), the strength of TL's expected effects may be *conditional* on factors that vary between the organisations in which it is enacted (see also Hallinger, 2011; Porter & McLaughlin, 2006). Among the multitude of factors that might play such a moderating role, we focus on the principals' span of control (e.g. Schyns et al., 2012).

If supervisors are to exert social influence by displaying TL behaviours, then sufficient opportunities for staff members to observe these behaviours represent an indispensable prerequisite. An organisational context in which the frequency of interaction between leaders and staff members is generally low may therefore limit the availability of information about the leader and function as a *neutraliser* of TL's intended effects (Cole et al., 2009). Conforming to this premise, Gerick's (2014) survey regarding teacher perceptions of their principals' TL behaviours revealed interactional frequency to be the strongest predictor of the teachers' ratings.

Studies in non-school settings have demonstrated that building and maintaining high levels of interpersonal exchange constitutes an essential aspect of effective TL (e.g. H. Wang et al., 2005). Yet they also suggest that the interactions required are comparably easier to establish when the supervisor's span of control is small rather than large (Schyns et al., 2012). As the number of direct subordinates increases, the context in which

leadership is enacted transitions from close to distant. Chun and colleagues (2009) indicate that a *distant leadership situation* is characterised by minimal leader-related information, occasional observation of the leader's actual day-to-day behaviours, symbolic impression management and indirect experience with the leader. Moreover, several findings support the idea that positive associations between TL and staff members' commitment, effort and performance are stronger in close than in distant leadership situations (summarised in Gumusluoglu et al., 2013). Similarly, empirical results regarding school leadership emphasise that it is easier for principals to cultivate person-centred leadership practices through face-to-face interaction when the number of faculty members is low (c.f. Southworth, 2004; Warwas, 2015)

Close or distant leadership situations may affect both *individual-focused* and *group-focused* TL behaviours. In order to activate followers' relational selves, regular interpersonal exchanges in dyadic leader-follower relations are needed that allow followers to feel connected to and appreciated by the leader (Kark & Shamir, 2013). When the number of direct subordinates is high, leaders face serious time constraints for sustaining constant interaction and nurturing trustful relationships with each staff member, paying attention to individual needs and concerns, supporting individual routes of professional development, and fostering individual resourcefulness in breaking up routines or dealing with problems (Avolio et al., 2004). In other words, a leader's attempts to provide *intellectual stimulation* and *individualised consideration* are increasingly impaired as the number of interaction partners rises, such that the generally positive effects of these TL behaviours on followers' professional attitudes and practices may attenuate where the span of control is too great. Moreover, the positive effects of group-focused TL facets, *inspirational motivation* and *idealised influence*, may also wane given these circumstances. Communicating an attractive vision equally to all staff

members or conjuring up unifying values becomes a more complicated and less effective task with a growing span of control (Berson et al., 2001). In addition, the supervisor's visibility as an observable role model is usually lower in distant leadership situations, rendering it more difficult for subordinates to emulate these attributes (Cole et al., 2009).

Aims and Hypotheses

As described above, studies that differentiate *individual-focused* from *group-focused* dimensions of TL and analyse their respective relationships with target variables at the individual and group level of followers *simultaneously* are missing in educational settings. The present study aims to offset this deficit by examining the dimensional structure of principals' TL behaviours in a sample of Swiss schools and investigating the prognostic value of the dimensions obtained for teachers' self- and group-referential efficacy beliefs, using multilevel analysis. Based on Kark and Shamir's (2013) *dual effects model* of TL, we expect the following:

Hypothesis 1: Individual- and group-focused dimensions of principals' TL behaviours can be empirically distinguished.

Hypothesis 2: Individual-focused TL positively predicts teacher efficacy; group-focused TL positively predicts collective efficacy.

Inspired by discussions regarding the relevance of context on leadership effects (e.g. Hallinger, 2011), we also aim to test whether TL's assumed relationships with target variables differ between close and distant leadership situations. Following the argument that TL is more effective under conditions of high interaction frequency and observability of the leader (e.g. Chun et al., 2009), we assume that:

Hypothesis 3: A high span of control reduces the strength of TL's positive relationships with teacher efficacy and collective efficacy.

Figure 3 depicts the full model for the proposed *moderated dual effects* of principals' TL behaviours.

Method

Sample and Data Collection

Data collection constituted part of the project 'School Leadership Practice, School Context and School Quality: A Quantitative Study of their Relationship in the German-speaking Part of the Canton of Berne', funded by the Swiss National Science Foundation (SNSF; Program DORE # 13DPD3_136877). The full sample consisted of 241 principals and 3,197 teachers from 180 public schools (compulsory schooling: pre-school, primary and lower secondary level) in the German-speaking part of the canton of Berne, Switzerland. Approximately one quarter of these schools were led by a team of two principals, and in rare cases even three principals (Windlinger & Hostettler, 2014). In order to test the hypotheses described in the previous section, a subsample was selected, consisting of 1,702 teachers in 118 schools led by only one principal. The other schools were excluded in order to ensure undistorted assessments of a particular leader's TL and a precise measure of his/her span of control. In cases with only one principal, teachers' ratings of leadership behaviours have a clear referent, and span of control corresponds with the number of teachers employed in the school. In the selected schools, the principals have direct managerial responsibility for teachers (e.g. conducting regular staff appraisals) and there is no middle management.

Research assistants administered the questionnaires during one of the school's regular staff meetings, attaining an average participation rate of 71% across all schools. Only five teachers refused to take part in the survey. The remainder of the non-participants comprised absentees, most of them teachers who only worked part-time for a few hours per week. The number of participants per school averaged 14.42 ($SD = 8.07$;

Min = 2, Max = 41). The characteristics of the principals in our sample reflected those of the canton's principal population (Windlinger & Hostettler, 2014). On average, the investigated principals were 50.1 years old ($SD = 7.3$) and had occupied their position for 11.9 years ($SD = 7.6$). Roughly half (47.5%) were female. As is typical of schools in the investigated canton, numerous principals were employed part-time ($M = 46.5\%$, $SD = 27.7\%$), and the majority (63.6%) also worked as teachers in their schools.

Measures

Aside from the moderator variable, all measures stemmed from the teacher questionnaires and were rated on Likert scales ranging from 1 (lowest score) to 6 (highest score).

Descriptive statistics and reliability values are reported in Table A1 in the *Online Appendix*.

Individual-focused and group-focused transformational leadership were assessed using the Multifactor Leadership Questionnaire MLQ Form 5x short (Bass & Avolio, 1995). Items were sorted into individual- or group-focused categories according to theoretical reasoning (Kark & Shamir, 2013; X.-H. Wang & Howell, 2010). Items with ambiguous wordings as well as items with multiple factor loadings in a preliminary exploratory factor analysis were excluded. This resulted in a measure of group-focused TL consisting of six items belonging to the subscales *inspirational motivation* and *idealised influence*, and a measure of individual-focused TL with seven items stemming from the subscales *individualised consideration* and *intellectual stimulation*.

Teacher efficacy was measured using the teachers' sense of efficacy scale (TSES; Tschannen-Moran & Hoy, 2001), which in its short form consists of 12 items covering three subscales: *efficacy in classroom management*, *in instructional strategies*, and *in student engagement*. For the latent variable *teacher efficacy*, the means of the three subscales served as manifest indicators.

Collective efficacy was assessed with six items from an instrument by Schwarzer and Jerusalem (1999). Consistent with the theoretical considerations outlined above, this instrument is based on a referent-shift consensus model (van Mierlo et al., 2009), whereby teachers responded to items that referred to the teaching staff as a whole (“our team”, “we teachers”). We chose six items that focus on pedagogical innovations and school improvement, indicating professional tasks that clearly necessitate concerted actions.

Principals' span of control denotes the number of teachers working in a school that is led by only one principal. It serves as a proxy variable for close or distant leadership situations ($M = 20.9$, $SD = 11.8$, $Min = 3$, $Max = 53$) and was reported by the principals.

Statistical Procedure

In order to avoid problems resulting from aggregation or disaggregation strategies (Heck & Thomas, 2015) and to account for the hierarchical structure of the data, we used doubly latent multilevel structural equation models (ML-SEM). This allowed us to estimate theoretical constructs as latent factors at both the teacher and the school level. Indeed, we effectively controlled for measurement errors by specifying all latent factors through multiple manifest indicators. Moreover, we controlled for sampling errors at the school level by conducting latent aggregation of teacher ratings to form school-level constructs (Marsh et al., 2009; Morin et al., 2014).

All analyses were conducted in Mplus 7.31 (Muthén & Muthén, 1998-2015). We used the maximum likelihood estimator (MLR), which provides standard errors and a chi-square test statistic that are robust to non-normality and non-independence of observations, combined with the full information maximum likelihood (FIML) method to deal with missing values (Heck & Thomas, 2015). The number of missing values per item

was low, reaching a maximum of 4.5% in one of the TL scales. No missing values appeared for span of control.

We took the following steps to investigate our hypotheses. The first step served to examine whether our data fulfilled several requirements for use in doubly latent models (see Table A1 in the *Online Appendix*). Specifically, we checked the values of ICC (1) and ICC (2) (Lüdtke et al., 2007, p. 218), the average deviation index ADM (Burke & Dunlap, 2002) and the McDonalds omega coefficient (see Morin et al., 2014). These figures indicated a substantial amount of variance at the school level, satisfactory reliability of the constructs at both levels, and, for the group-level constructs, satisfactory agreement among raters within each school (Morin et al., 2014). It is important to note that the principals in our sample differ systematically regarding the extent to which they employ group-focused *and* individual-focused TL behaviours, and schools systematically differ regarding the general levels of both collective and teacher efficacy among staff. In the second step, we tested each construct separately in a two-level confirmatory factor analytic measurement model. We constrained factor loadings to be equal at both levels, because there was no reason to assume deviation. Furthermore, this specification generates stable estimators and allows to directly compare factor variances across levels (Morin et al., 2014). Predictor variables were grand-mean-centred in these and all further analyses. In a third step, reported in the section titled *Measurement models*, we estimated and compared three *complete* measurement models containing all predictor and criterion variables in order to test Hypothesis 1. The first model served to check common source/method variance by allowing *all four constructs* to form a single factor at each level (Podsakoff et al., 2003). The other two models served to contrast the fit indices for a three-factor model and four-factor model at both levels. Whereas the three-factor model differentiates between individual and collective efficacy beliefs but assumes TL to be one

monolithic construct (single latent TL factor), the four-factor model additionally separates group-focused and individual-focused dimensions of TL. In the final steps, reported in the sections *Dual effects model* and *Moderated dual effects model*, we specified two multilevel structural equation models to test Hypothesis 2 and 3.

Model evaluation was informed by the following boundary values (Heck & Thomas, 2015; Hu & Bentler, 1999): comparative fit index (CFI) and Tucker-Lewis index (TLI) values $\geq .95$ ($\geq .90$), root mean square error of approximation (RMSEA) values $\leq .06$ ($\leq .08$), and standardised root mean square residual (SRMR) values $\leq .05$ ($\leq .10$) indicate good (adequate) fit. Akaike information criteria (AIC) and Bayesian information criteria (BIC) served to compare nested models, whereby lower values indicate a better fit. Effect sizes (see Marsh et al., 2009; Morin et al., 2014) can be interpreted according to Cohen's (1992) guidelines, with values above .10 indicating small effects, above .30 moderate effects, and above .50 large effects.

Empirical Results

Measurement Models

When comparing the three measurement models, superior fit indices for the four-factor model appear (see Table 1). Thus, a model with four latent factors at both levels represents the structure of our data better than a one-factor model, in which all indicators for predictor as well as criterion variables load on one factor at each level only (Satorra-Bentler χ^2 difference test; $TRd = 3486.51$, $df = 15$; $p < .01$). This finding suggests that although our study uses self-report data, intercorrelations between distinct factors are not overly inflated by common source/method variance (Podsakoff et al., 2003). Furthermore, the four-factor measurement model outperforms a three-factor model, which assumes that teacher efficacy ratings and collective efficacy ratings are separable constructs, whereas ratings of leadership behaviours form just one latent TL factor (Satorra-Bentler

χ^2 -difference test; $TRd = 469.09$, $df = 7$; $p < .01$). This confirms *Hypothesis 1*, which posited that individual- and group-focused dimensions of principals' TL can be empirically distinguished. The four-factor measurement model further exhibits satisfactory factor loadings. With the exception of one loading of .38, all loadings were $\geq .58$.

Dual Effects Model

In order to test Hypothesis 2, we estimated a ML-SEM based on the four-factor measurement model. Results are documented in Figure 4 and Table A2 in the *Online Appendix*. We expected individual-focused TL to positively predict teacher efficacy, and group-focused TL to positively predict collective efficacy. Our data support this assumption (model fit: $\chi^2(429) = 1542.883$, $p < .01$, CFI = .927, TLI = .921, RMSEA = .039, SRMR(within) = .040, SRMR(between) = .125).

However, it can be noted that the dual effects of latent TL dimensions primarily account for *between-school differences*. Group-focused TL relates to group-referential efficacy beliefs with a moderate to strong effect ($B = .551 (.147)**$; effect size = .475 (.119)**), explaining 26% of total variation in school-specific scores of collective efficacy. Stated differently, schools in which teachers (consistently) assess their principals' group-focused TL as high yield markedly higher (mean) levels of collective efficacy than schools in which teachers make a comparably (and congruently) lower assessment of their principal's group-focused TL. In addition, individual-focused TL predicts differences in school-specific (mean) scores of teacher efficacy ($B = .133 (.045)**$; $R^2 = 17\%$; small effect: effect size = .230 (.078)**). Schools in which principals are (consistently) rated as employing strong, individual-focused TL demonstrate higher (mean) levels of self-referential efficacy beliefs among staff members than schools with principals whose individual-focused TL is (consistently) judged to be modest or lacking.

At the same time, *inter-individual* differences of teacher efficacy within each school are systematically and moderately associated with staff members' individual ratings of their principal's individual-focused TL ($B = .085 (.022)**$; effect size = $.326 (.083)**$).

However, this teacher-level predictor does not account for much variance ($R^2 = 1\%$).

Moderated Dual Effects Model

To investigate if *span of control* alters the relational strength between TL and efficacy, we calculated the main effects of span of control on both target measures, interaction effects for span of control x group-focused TL as well as span of control x individual-focused TL on the school level, and a cross-level-interaction of span of control on the slope of individual-focused TL on teacher efficacy. The results indicate that at the school level, span of control moderates associations between *group-focused TL* and *collective efficacy* (see Figure 5 and Table A2 in the *Online Appendix*). Given that there was neither a significant moderator effect on the relationship between individual-focused TL and teacher efficacy on any level nor a main effect of span of control on teacher efficacy, we calculated a more parsimonious model (not reported here) without these paths. This yielded very similar results. By including span of control in the predictive model, the amount of explained variance in the group-referential efficacy beliefs of teachers from different schools rises from 26% to 46%.

As depicted in Figure 6, associations between group-focused TL and collective efficacy increase in strength with declining spans of control. This finding lends partial support to *Hypothesis 3*.

Discussion

Our study aimed to examine the *differential effects* of transformational leadership (a) at different analytical levels of schools and (b) as a function of varying organisational conditions. Thus, it contributes to previous research in a number of ways.

First, our study is to our knowledge the first to test a dual effects model of TL in a school setting, thereby complementing available evidence regarding transformational school leaders with a social-psychological explanation of their actions and impact. Our results demonstrate that individual- and group-focused dimensions of TL can be distinguished conceptually and empirically. In line with findings from non-school settings, they indicate that TL is not a monolithic but rather a dual-faceted construct with behavioural components targeted at individual followers and groups of followers (Tse & Chiu, 2014). Thus, disentangling distinct foci of principals' leadership behaviours and selecting appropriate target measures can contribute to a more nuanced and consistent picture of TL in schools, as strongly recommended by Robinson et al.'s (2008) critical meta-analysis.

Second, our results corroborate but also refine earlier findings regarding the predictive value of TL for teacher beliefs of their individual and collective capabilities to handle the demanding tasks of their profession. Conforming to theoretical reasoning, systematic relations are demonstrable between individual-focused TL and teacher efficacy, and between group-focused TL and collective efficacy when employing statistical models that permit *simultaneous* estimation of these dual effects and control for measurement and sampling errors (ML-SEM). Interestingly, this analytical strategy reveals that the dual effects model is particularly powerful in predicting *inter-organisational* variations in staff members' efficacy beliefs. *School-specific* scores of group-focused and individual-focused TL, as reflected in teachers' *shared* perceptions of their respective principals' leadership behaviours, explain substantial amounts of *school-specific* mean-value differences in collective efficacy and teacher efficacy. Our findings document that

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- the more a principal is (consistently) deemed to provide *inspirational motivation* and *idealised influence*, the stronger are (shared) beliefs of group potency among staff members;
- the more a principal is (consistently) considered as granting *individualised consideration* and *intellectual stimulation*, the higher are staff members' self-referential efficacy beliefs, on average.

Although individual teachers' perceptions of individual-focused TL *within each school* also positively relate to individual convictions of coping abilities for professional demands, these associations only account for a very small proportion of *inter-individual differences* in teacher efficacy. This means that variations in self-referential efficacy beliefs among teachers belonging to the same school may be attributable to factors that we did not consider, such as collegial support or teaching experience (Tschannen-Moran & Hoy, 2007). However, our findings on the school-level of analysis suggest that individual-focused TL is probably most effective when used as a 'leadership style' in the sense of being granted to every teacher within a school, and not just to selected teachers. When interpreting our finding, one must consider the fact that the scale of individual-focused TL merely assesses if and to what extent a principal provides *individualised consideration* and *intellectual stimulation*. Whereas *the specific ways* of targeted support for each teacher may well differ, it is important that every teacher receives and perceives targeted support (see also Wu et al., 2010). Such a relationship manifests itself in substantial *mean-value differences* of both TL behaviours and their relationships with staff's sense of efficacy across all investigated schools. Moreover, it seems plausible that teacher efficacy and collective efficacy mutually influence each other. Individual-focused TL may have an indirect effect on collective efficacy via teacher efficacy, and group-focused TL may influence teacher efficacy indirectly via collective efficacy. These

processes may contribute additionally to between-school differences in staff's efficacy beliefs and certainly deserve further examination (see, for example, Goddard et al., 2004).

Third, we responded to recurring calls in the field to account for school-specific conditions that might influence the relationship between principals' TL and desirable outcomes (e.g. Hallinger, 2011). Our analysis of principals' *span of control* partly confirmed our expectations by revealing that it moderates the link between group-focused TL and collective efficacy: the strength of positive associations between these constructs demonstrably increases as the principal's span of control decreases. Thus, it seems to be easier to communicate an attractive vision to the whole group and to provide a role model with appealing characteristics in *close leadership situations* (e.g. Berson et al., 2001). Contrary to our expectations, we found no moderating effect of span of control in the relationship between individual-focused TL and teacher efficacy at any level of analysis. This result warrants further investigation. We suspect that in our sample, it may simply be due to low variability in the teacher efficacy variable.

Limitations and Directions for Future Research

Although our study builds on a strong theoretical foundation and a relatively large sample of Swiss schools, its cross-sectional design and reliance on teacher reports precludes causal conclusions. We cannot completely dismiss the possibility that more efficacious teachers perceive their principals to be more transformational. Future research should use longitudinal designs in order to corroborate the assumed dual effects of TL on teachers' efficacy beliefs (Wu et al., 2010). The use of observational measures may add to unambiguous empirical evidence, even though in the present study, associations between the investigated constructs were demonstrably not inflated by common source variance. Moreover, neither group-level effects (Hoffmann et al., 2011) nor interaction effects can be mere artefacts of common rater variance (Siemsen et al., 2010).

Principals' span of control is a systematic moderator of relations between the group-level constructs in our study. While this organisational-structural element provides an important indicator of close/distant leadership situations, additional indicators such as physical and power distance (Antonakis & Atwater, 2002) merit thorough investigation. Furthermore, span of control is only a proxy measure for observability of and interaction frequency with the principal. In order to elucidate the variety and quality of principal-follower interactions in detail, diary methods for continuous data collection seem to be particularly advantageous.

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Table 1*Fit Indices of Doubly Latent Measurement Models*

Model	Chi-square (df)	AIC	BIC	CFI	TLI	RMSEA	SRMRw SRMRb
One-factor model (Harman's single factor)	5559.848 (440)**	85521	85999	.662	.645	.083	.102 .234
Three-factor model (single factor TL)	2137.221 (432)**	82353	82875	.888	.880	.048	.045 .120
Four-factor model (dual factor TL)	1508.691 (425)**	81773	82334	.929	.922	.039	.035 .121

Note. AIC = Akaike information criteria; BIC = Bayesian information criteria; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardised root mean square residual; w = within; b = between; TL = transformational leadership.

** = $p < .01$.

Figure 1

Basic Model Design.

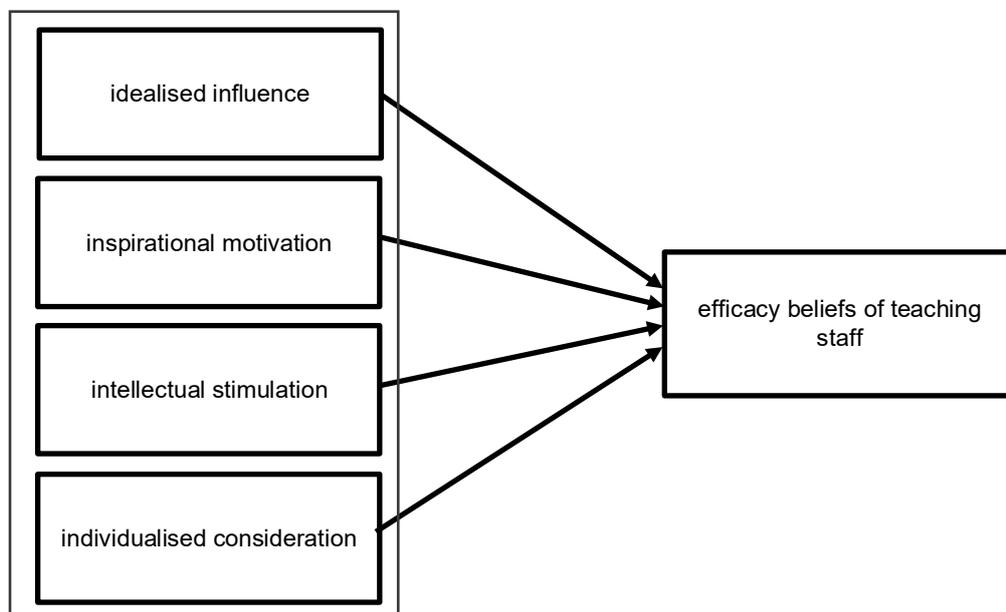


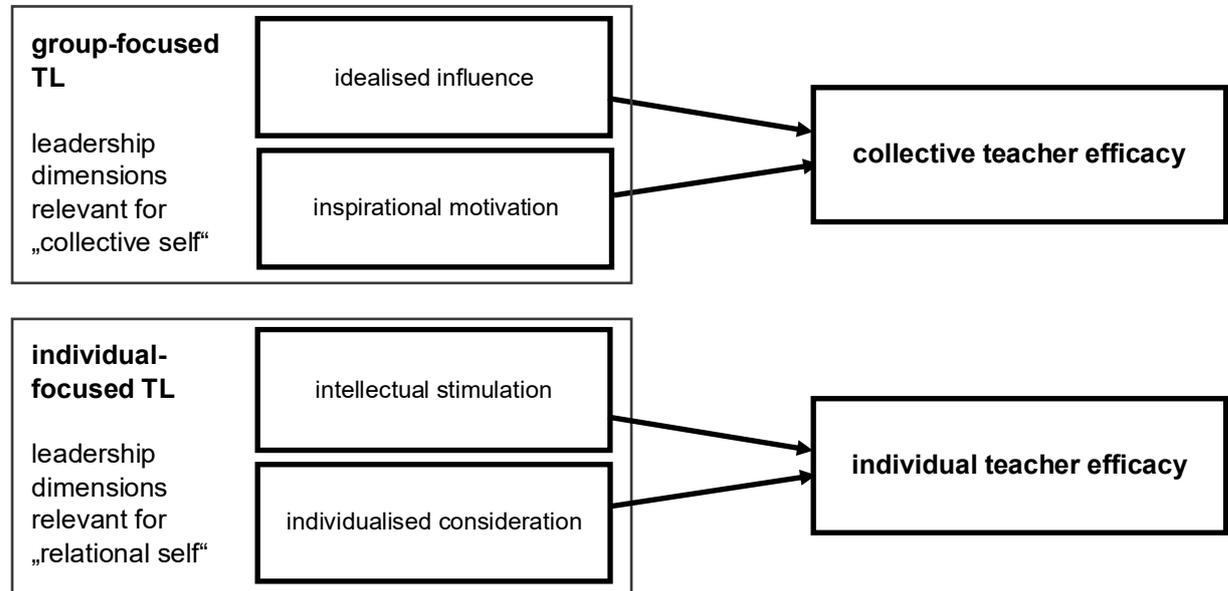
Figure 2*Dual Effects Model Design*

Figure 3

Dual Effects Model with Moderator Variable

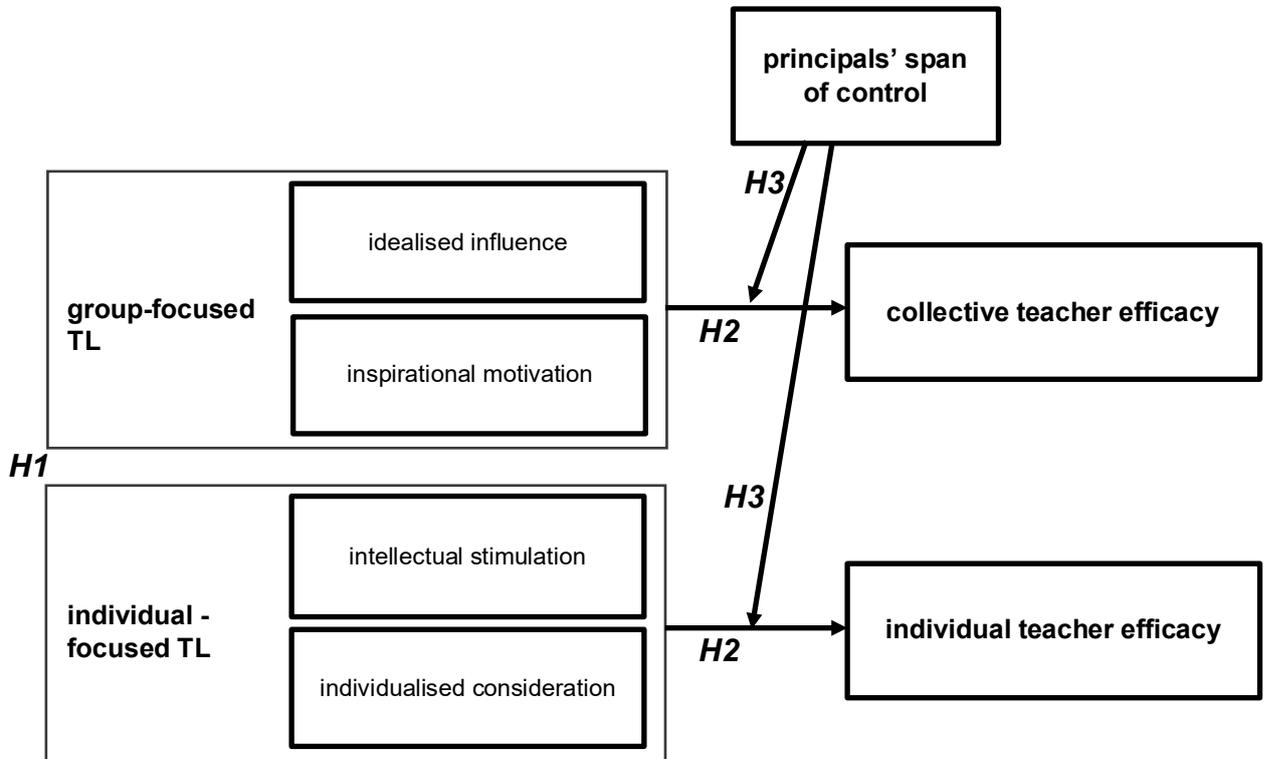
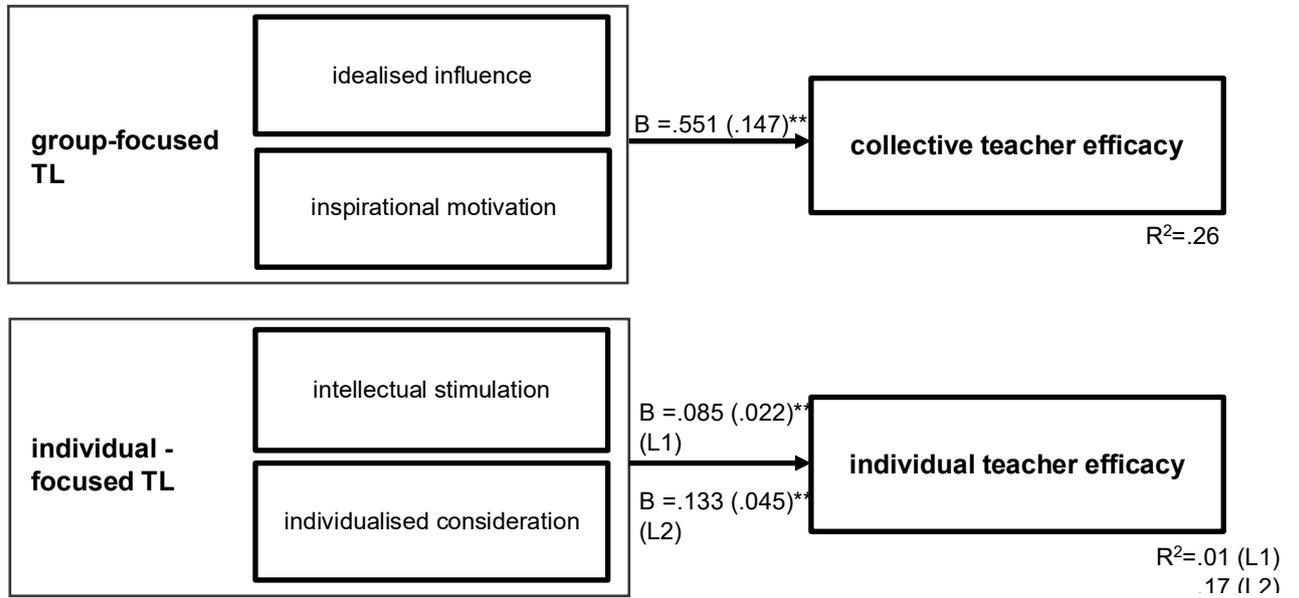


Figure 4

Dual Effects Model of Principals' TL Behaviours and Teachers' Beliefs of Individual and Collective Efficacy



L1 = Level 1 (teacher level); L2 = Level 2 (school level)

Figure 5

Moderated Dual Effects Model with Principals' Span of Control as a Moderator

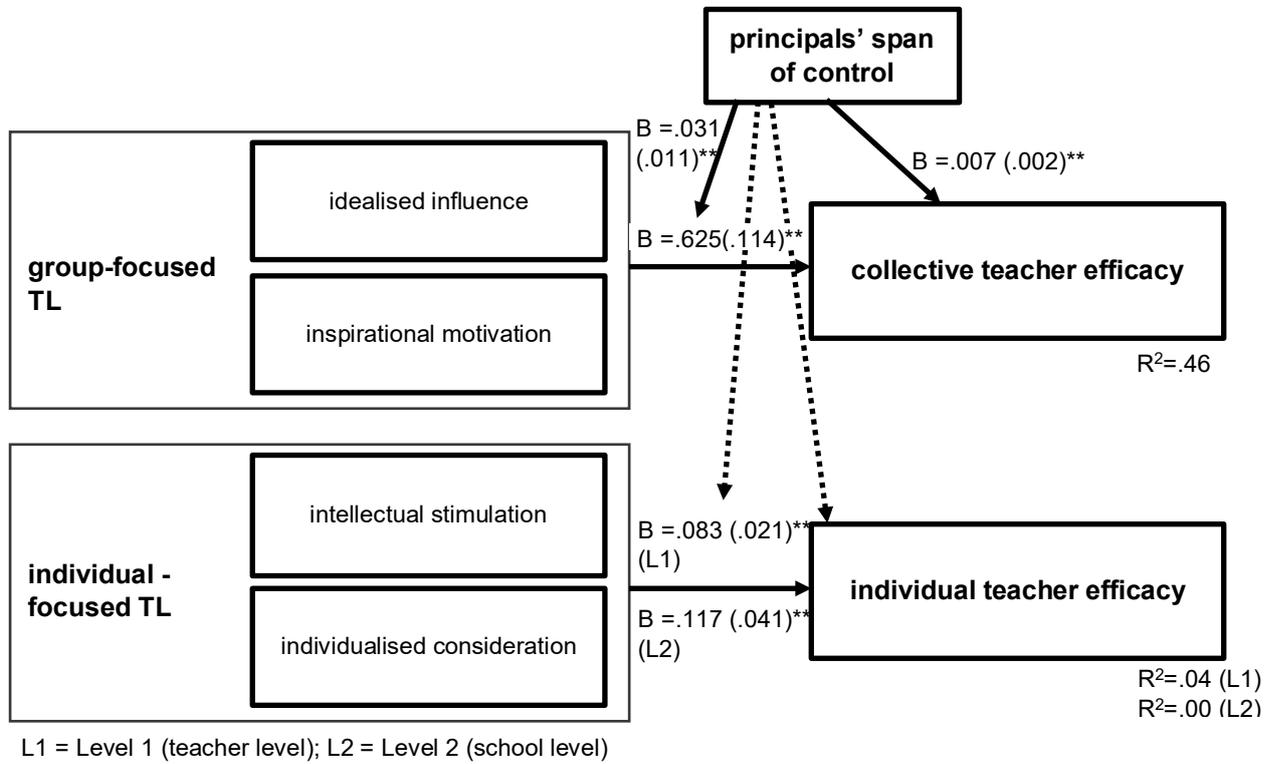
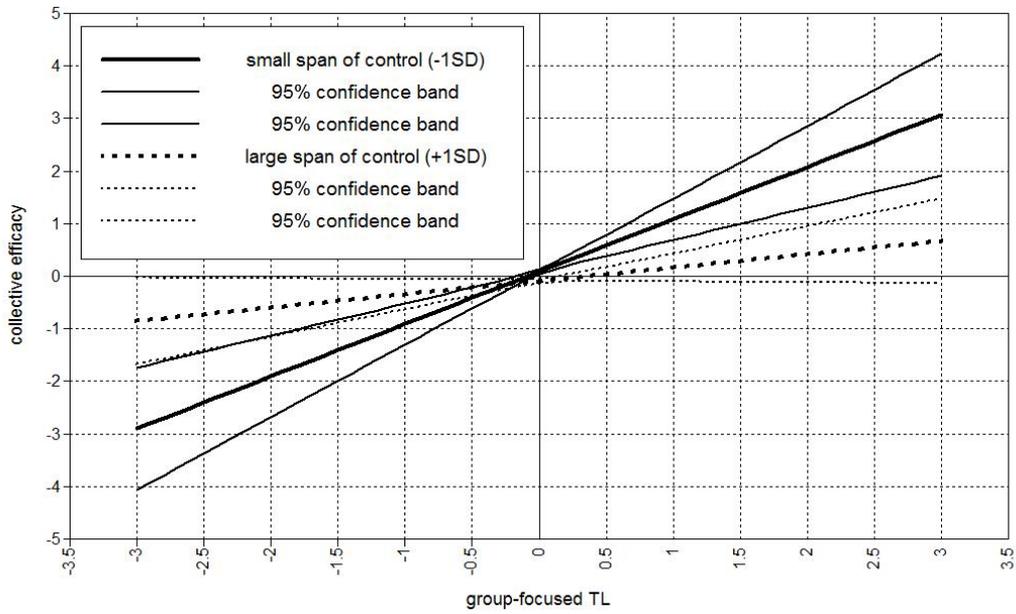


Figure 6

Interaction Effect of Principals' Span of Control and TL on Collective Teacher Efficacy



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Supplemental Online Material

Appendix for

Dual Effects of Transformational Leadership on Teacher Efficacy in Close and Distant
Leadership Situations

Table A1*Descriptive Statistics, Measures of Reliability and Interrater Agreement, and Sample Items for all Variables*

Variable	#	Sample Item	<i>M</i>	<i>SD</i>	α	ω_w ω_b	ICC(1)	ICC(2)	ADM
Group-focused TL	6	The principal articulates a compelling vision of the future	4.75	0.71	.81	.771 .946	.25	.83	.46
Individual-focused TL	7	The principal helps me to develop my strengths	4.79	0.80	.90	.887 .975	.17	.75	.51
Collective efficacy	6	I am confident that we teachers together can achieve pedagogical quality even if the school resources should diminish	4.47	0.73	.83	.806 .977	.18	.76	.47
Teacher efficacy	12	How much can you do to motivate students who show low interest in school work?	4.95	0.41	.83	.709 .901	.06	.47	.28

Note. # = Number of items; α = Cronbach's Alpha; ω_w/ω_b = McDonalds' Omega within/between; ICC(1) = Intra-Class-Correlation 1; ICC(2) = Intra-Class-Correlation 2; ADM = Mean Absolute Deviation Index; TL = Transformational Leadership.

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In order to estimate latent group-level constructs reliably from individual ratings of the respective group members (Lüdtke et al., 2006: 218), a significant ICC(1) and an acceptable ICC(2) value of .70 or higher is needed (van Mierlo et al., 2008). The average deviation index ADM (Burke and Dunlap, 2002) is a measure of within-group agreement, which, in our case, quantifies individual teachers' deviation from the school mean in the original scale metric. For a 6-point scale, a cutoff point of 1 has been proposed. The composite reliability coefficients (McDonalds' Omega) can be interpreted like traditional reliability estimates (see Morin et al., 2014:158).

Table A2*Results of (Moderated) Dual Effects Models*

Label	Dual effects model			Moderated dual effects model
	<i>B (SE)</i>	β (<i>SE</i>)	<i>ES (SE)</i>	<i>B (SE)</i>
<u><i>School-level (L2) effects</i></u>				
ind-focused TL → ind. teacher efficacy	.133 (.045)**	.457 (.128)**	.230 (.078)**	.117 (.041)**
group-focused TL → collective efficacy	.551 (.147)**	.503 (.088)**	.475 (.119)**	.625 (.114)**
ind-focused TL x span of control → ind. teacher efficacy				-.004 (.003)
span of control → ind. teacher efficacy				.000 (.001)
span of control → slope (crosslevel int.)				-.031 (.011)**
group-focused TL x school size → collective efficacy				-.007 (.002)**
span of control → collective efficacy				
<u><i>Teacher-level (L1) effects</i></u>				
ind-focused TL → ind. teacher efficacy	.085 (.022)**	.162 (.038)**	.326 (.083)**	.083 (.021)**

Note. TL = transformational leadership; ES = effect size; for the moderated dual effects model, only unstandardized parameters can be reported due to the numerical integration in Mplus.

** = $p < .01$.

6.2 Study II

Effects of Leadership in Teachers' Daily Work Life

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This research was supported by Bern University of Teacher Education, PHBern, Switzerland, under Project Number 13 s 004 01.

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Abstract

Purpose: This study investigates how leadership affects teachers' daily work-related well-being. We examine the relationship between constructive forms of vertical and shared leadership and characteristics of social interactions of teachers at work and their pleasant affect and state work engagement.

Research Methods: Multilevel analyses are based on data from a baseline questionnaire and diary data (2 measurements per day, n=1313) from 72 teachers from 15 schools in Switzerland.

Findings: Teachers report experiencing vertical as well as shared leadership. They mainly interact with other teachers and only report few interactions with the principal. Results show that constructive vertical (but not constructive shared) leadership is related to interaction quality, namely the experience of support and satisfaction with the outcome of the interaction, and further to pleasant affect and state work engagement. The effect of constructive vertical leadership on pleasant affect is mediated through satisfaction with the outcome of the interaction.

Implications for Research and Practice: To gain more insight into how principals influence interaction quality, future studies should combine teacher diaries with more extensive assessments of principals' practice. Principals seeking to enhance positive resources for teachers and influence positive work outcomes should intensify constructive forms of leadership and positive social interactions with staff.

Article classification: Empirical paper

Keywords: vertical and shared leadership; social interaction; teacher well-being; diary study; multilevel analysis

Effects of Leadership in Teachers' Daily Work Life

School leadership influences working conditions in schools. There is ample evidence of the positive effects of leadership on teachers' individual and collective attitudes and behaviours and hence indirectly on student outcomes (Leithwood & Sun, 2012). Most studies on school leadership have focused on vertical leadership and analysed how the perceived leadership of the school principal relates to school and teacher characteristics in cross-sectional designs. With the increasing awareness of scholars that school leadership is not restricted to the principal, more studies investigate collaborative (Hallinger & Heck, 2010) or distributed leadership (Harris, 2013). While these studies consider to what extent teachers are involved in leadership processes or how leadership functions are formally distributed across different people, they rarely focus on all teachers as potential sources of exerting influence. If we define leadership as the process of influencing others with the aim of reaching shared objectives, leadership can stem both from the formally appointed leader ("vertical leadership") as well as from co-workers ("shared leadership"; Pearce & Conger, 2003). Moreover, leadership influence – whether vertical or shared – can take on different forms, such as empowering, transformational, transactional, directive, or aversive (Pearce & Sims, 2002). Just like a principal can show different leadership behaviours towards a teacher, so can a colleague. A colleague showing a teacher, how he / she can solve a problem independently would be an example of empowering shared leadership behaviour, whereas a colleague showing satisfaction, when a teacher fulfils his/her expectations would be an example of transactional shared leadership behaviour. Therefore, if we want to know more about the effects of leadership in teachers' daily work life, we need to study the influence of all sources of leadership (Yammarino et al., 2012). To what extent do teachers perceive

certain kinds of vertical leadership behaviours by their principals and to what extent do they perceive certain kinds of shared leadership behaviours by their colleagues?

A solid body of research indicates that teachers' internal states like job satisfaction or commitment are influenced by school leadership (Leithwood & Sun, 2012), but it is less clear, how leadership affects *teachers daily work-related well-being* and through what processes this happens. We propose that social interactions play a key role. They represent affective events (Weiss & Cropanzano, 1996) that trigger affective reactions, which in turn are translated into long-term outcomes. We propose that the quality of social interactions at work (i.e. the experience of support and satisfaction with the outcome) is influenced by leadership style (vertical and shared) at the workplace. For this purpose, we focus on constructive forms of vertical and shared leadership (empowering, transformational, and transactional, Pearce & Sims, 2002). Figure 1 shows the theoretical model with the hypothesised relationships between leadership, social interactions and teacher well-being. In schools, where teachers' work in the classroom is relatively autonomous (Scheerens, 2012), social interactions with other teachers, the principal, and other staff may be of specific importance as a link between teachers' daily work experiences and the wider school system.

A daily-diary design allows us to investigate effects of leadership on work events and their connection with two indicators of work-related well-being that fluctuate over time: pleasant affect and state work engagement (Sonnentag, 2015). This design captures "life as it is lived" (Bolger et al., 2003, p. 579) and affords insight into the processes at work. Some diary studies have analysed how daily variations in leadership behaviour relate to daily outcomes (e.g. Breevaart et al., 2014; Tims et al., 2011). Other studies focused on leadership style as a (relatively stable) characteristic of the workplace and examined interactions with

the leader and their relationship to employees' daily well-being (see Ohly & Gochmann, 2015). We follow this approach and extend it by including vertical as well as shared leadership as a characteristic of the workplace. In addition to interactions with the leader we also include interactions with other teachers.

Summing up, our aim is to look at constructive vertical and shared leadership in schools and to shed light on the role of both sources of leadership in teachers' daily work lives. We will examine the relationship between constructive vertical and constructive shared leadership and characteristics of daily interactions of teachers at work and further with teachers' pleasant affect and state work engagement.

Our study extends existing literature in three ways. First, it follows calls to examine all sources of leadership (Yammarino et al., 2012; Zhu et al., 2018) by analysing effects of both vertical and shared leadership simultaneously in a school setting, thereby focusing on outcomes that are important for teachers but also connected to school quality. Second, we combine inter- and intra-individual approaches in the study design, which allows us to study the effects of relatively stable characteristics of the workplace on experiences in daily work life. The daily-diary design allows us to examine experiences almost in "real-time" and therefore reduce retrospective bias (Schwarz, 2012). Finally, by looking at the role of social interactions in this process we can gain insights into an important class of indirect effects of leadership.

Teachers work-related well-being

Work-related well-being includes evaluations, emotions and the quality of experiences at work (see Ilies et al., 2015). Teachers with high work-related well-being are satisfied with their work and experience positive emotions frequently. Work-related well-

being therefore comprises of cognitive evaluations such as job satisfaction and affective experiences such as engagement and happiness (Bakker & Oerlemans, 2013). We chose two indicators of affective work-related well-being for this study that show fluctuations depending on current events: *Pleasant affect* and *work engagement* (Sonnentag, 2015). *Pleasant affect* refers to pleasant emotional states which influence work-related attitudes and behaviours in daily work life (Weiss & Cropanzano, 1996) and are related to employee health and positive organizational functioning (Ilies et al., 2015). In schools, pleasant affect of teachers is related to student motivation and well-being (Sutton & Wheatley, 2003). *Work engagement*, in turn, is defined as “a positive, fulfilling and work-related state of mind” (Hakanen et al., 2006, p. 498). Engaged employees work with high levels of energy (vigour), a strong involvement in their work (dedication), and immersion in their tasks (absorption). Work engagement is related to positive organizational outcomes, such as job performance (Bakker & Oerlemans, 2013). In schools, Hakanen et al. (2006) found a relationship with teachers’ organizational commitment, and Bakker and Bal (2010) showed teachers’ weekly engagement to be positively related to their weekly performance.

Vertical and shared leadership in schools and teachers work-related well-being

Leadership in schools can stem from the principal in the form of vertical leadership as well as from other teachers in the form of shared leadership. Shared leadership, therefore, is “a dynamic, interactive influence process among individuals in groups for which the objective is to lead one another to the achievement of group or organizational goals or both” (Pearce & Conger, 2003, p. 1). This is similar to certain definitions of distributed leadership and the terms are often used interchangeably. However, the construct of distributed leadership is still “elusive” due to conceptual, operational, measurement and contextual

issues (see Hairon & Goh, 2015). Moreover, it is unique to the concept of shared leadership to also consider different *forms* of shared leadership behaviour.

Although shared leadership may serve as a substitute for vertical leadership to a certain degree, it is generally not seen as a substitute but as a complementary resource for goal attainment (Pearce & Sims, 2002). It is not completely clear how vertical and shared leadership relate to each other. There is some evidence that transformational vertical leadership is a precondition (but not a sufficient one) of shared leadership in schools (Printy et al., 2009; see also Wang et al., 2014). Pearce and Sims (2002) showed that types of vertical and shared leadership are correlated and that the best predictor of shared transactional leadership, for example, is vertical transactional leadership. The authors explain this finding by role-model influences on part of the formal leader. Because one cannot infer any causal links between the two types of leadership when they are assessed at the same time, for our study we treat them as correlated predictor variables.

Several meta-analyses demonstrated positive effects of *vertical leadership* in schools, especially for transformational leadership (e.g. Leithwood & Sun, 2012). School leaders have effects on school outcomes such as improved instruction and on teachers' working environment, including shared decision-making, shared goals, and organizational culture. Teacher-level outcomes that are influenced by transformational leadership in schools include job satisfaction, commitment, and behavioural aspects such as use of knowledge (Leithwood & Sun, 2012). Evidence on the effects of vertical leadership on daily well-being comes from studies that are not school-specific. The growing literature on leadership and employee affect shows how leaders influence affect and emotions directly through leaders' affective displays and through different mediating pathways such as a positive work environment (Ashkanasy

& Humphrey, 2014). In their systematic review, Skakon et al. (2010) show that positive leader behaviour and transformational leadership are associated with employee well-being. Also, several studies link constructive vertical leadership to work engagement (mainly transformational leadership, e.g. Breevaart et al., 2014; Tims et al., 2011).

In the case of *shared leadership*, meta-analyses confirmed a positive relationship of moderate strength between shared leadership and team effectiveness (e.g. Nicolaidis et al., 2014), with stronger relationships for newer forms of shared leadership (e.g. transformational, inspirational leadership) compared to shared traditional leadership that focuses on exchanges between leaders and followers and the maintenance of the status quo (Wang et al., 2014). Furthermore, shared leadership had a stronger relationship with attitudinal and behavioural outcomes compared to performance measures (Wang et al., 2014). When effects are assessed at the same time as effects of vertical leadership, shared leadership explains unique variance in team performance (Nicolaidis et al., 2014). Although evidence for shared leadership is not as clear as for vertical leadership, it also has been connected to positive affective outcomes such as the well-being of team members (Zhu et al., 2018). This leads us to propose:

Hypothesis 1: Constructive forms of vertical and shared leadership are positively related to (a) teachers' pleasant affect and (b) teachers' state work engagement.

Because leadership effectiveness depends on the organizational context (Porter & McLaughlin, 2006), it is important to consider some distinct features of schools. Schools can be described as "loosely coupled systems" (Weick, 1976) with substantial professional autonomy for the teachers. Moreover, principals can have large spans of control and therefore cannot interact with the individual teacher frequently. Teachers predominantly interact with

other teachers and supportive relations with colleagues in schools are important for teachers' well-being (Väisänen et al., 2017). Based on this rationale we expect shared leadership to be at least as important as vertical leadership for teachers' work-related well-being.

Social interactions as mediators of leadership effects on outcomes

Social interactions at work are an important part of daily work life (Dimotakis et al., 2011) and in schools, social interactions with co-workers and with the principal may play a vital role in connecting teachers to the social system of the school. Depending on the reason for / the content of the interaction, there are different processes that may be important for the interaction partners, like receiving social support or coming to a satisfactory outcome. Therefore, experience of support and satisfaction with the outcome of the interaction both capture aspects of positive social interactions at work that positively affect human capacity (Heaphy & Dutton, 2008).

Leadership and social interactions

The effect of leadership on social interactions at work can be direct or indirect. In the case of *vertical leadership*, the leader influences interaction quality directly through behaviours like providing support, giving feedback or clarifying goals (Skakon et al., 2010). Leaders indirectly influence interaction quality through shaping organizational culture and a positive work environment (Ashkanasy & Humphrey, 2014). Bono *et al.* (2007) showed that employees whose leaders exhibit a more pronounced transformational leadership experienced more positive emotions during their interactions with supervisors (direct effect) but also in interactions with colleagues and customers (indirect effect). By propagating meaning and conveying shared goals (transformational) leaders encourage employee cooperation to reach these goals and thereby increase social support among co-workers (Heaphy & Dutton, 2008).

Evidence from research in schools corroborates this by showing that transformational leadership is related to more teacher cooperation (Geijsel et al., 2009). We propose that documented effects of school leadership on shared goals and organizational culture (Leithwood & Sun, 2012) are also reflected in the quality of interactions teachers experience.

Shared leadership largely happens in social interactions, albeit not every social interaction is an enactment of leadership. It is related to many different indicators of relationship quality, including trust (Drescher et al., 2014), enhanced cooperation and cohesion (Wang et al., 2014), and team confidence (Nicolaidis et al., 2014). We assume that enhanced cooperation involves mutual support. In their review, Zhu et al. (2018) report further proximal outcomes of shared leadership that link to relationship quality and, by extension, to interaction quality, such as less conflict, team psychological safety, well-being of team members, and team learning behaviour.

Based on these findings, we expect the following:

Hypothesis 2: Constructive forms of vertical and shared leadership are positively related to interaction quality, namely to (a) higher experience of support in interactions and to (b) higher satisfaction with the outcome.

Social interactions and work-related well-being

Social interactions at work can be seen as affective events (Weiss & Cropanzano, 1996). When employees have positive interactions and a good team climate, they experience more positive affect and higher work engagement (Dimotakis et al., 2011; Sonnentag, 2015). Complementing evidence for effects of positive co-worker interactions on positive affect and work engagement, research shows similar effects for interactions with leaders, e.g. positive exchanges with the supervisor were related to weekly work engagement (Bakker & Bal,

2010). Social interactions are also the occasions where social support may be received. In schools, the amount of daily social support teachers received was related to their state work engagement (Simbula, 2010) and it contributed to teachers' experienced well-being (Väisänen et al., 2017).

Based on these findings we propose:

Hypothesis 3: Interaction quality (experience of support / satisfaction with the outcome) is related to (a) pleasant affect and (b) state work engagement.

As stated before, we expect the positive relationship between leadership and teachers' well-being to be mediated by the quality of the interactions they experience in their daily work life and propose:

Hypothesis 4: The effect of vertical and shared leadership on (a) pleasant affect and (b) state work engagement is mediated via interaction quality.

Method

Participants

72 teachers from 15 state schools providing compulsory schooling on preschool, primary and lower secondary levels in the German-speaking part of the cantons Berne and Solothurn, Switzerland, participated in the study. The sample consisted of 55 (76.4%) female and 17 (23.6%) male participants with a mean age of 43.8 ($SD = 11.3$) years. On average, they had 17.8 ($SD = 11.0$) years of experience in teaching and 12.0 ($SD = 10.5$) years of tenure in the current school. All teachers had a teaching qualification for at least one of the following levels: preschool, primary, lower or higher secondary level or special needs education. The number of pupils ranged from 79 to 710 ($M = 337,6$; $SD = 186.4$). There were 12 schools with 5 participating teachers, two schools with 3 teachers and one school with 6

teachers ($M = 4.8$ teachers per school). A comparison with teacher population data from the Swiss Federal Statistical office showed that the sample is representative with respect to age distribution and gender (data available from first author).

Procedure

To recruit the participants, we approached (in random order) the principals of state schools in the two cantons via e-mail and telephone. To make participation more attractive all participants received individual feedback about the findings of the study and took part in a draw to win one of three tablet computers. Principals who agreed to participate then informed their staff to find five teachers within their schools willing to participate, i.e. direct subordinates who worked full-time or part-time with a minimum of 3 days a week.

Data were collected between October 2014 and September 2015. The teachers first received a link to an online questionnaire and a member of the research team visited each school to clarify questions and to obtain written consent of the teachers. Each participant was assigned a personal ID code to pseudo-anonymize the data in a first step and participants were informed about their right to withdraw at any time without having to give a reason. None of the participants gave up during the study phase.

In the subsequent days, the teachers received e-mails with links to an online diary twice a day (midday and evening) for 10 working days, which corresponds to two weeks for those working full-time or a longer period for teachers working part-time. Teachers filled in diary questionnaires between 10 and 22 times ($M = 18.23$; $SD = 2.58$), resulting in 1313 diary entries in total.

Measures

Teacher questionnaire

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Constructive vertical and shared leadership were measured with 12 items each (Piecha et al., 2012). The items assess how often the principal of the school (*vertical leadership*) / the team colleagues (*shared leadership*) show certain transactional, transformational and empowering (4 items each) leadership behaviours. The answer scale ranged from *never* (1) to *regularly, almost always* (5). Internal consistency of the scale was $\alpha = .91$ for vertical and $\alpha = .80$ for shared leadership. Because teachers per school rated the leadership behaviour of the same principal, for constructive vertical leadership we formed an aggregate variable by averaging teachers' scores to a school mean.

Daily-diary

Because participants had to fill in the diary questionnaire twice during their workday for 10 days, we tried to keep the scales as short as possible and chose measures that had successfully been used in diary studies before.

Social interactions at work: Teachers reported social interactions at work with adults that lasted 10 minutes or longer or were especially meaningful (using an adapted version of the Rochester Interaction Record, Reis & Wheeler, 1991). They indicated the partners' professional role (maximally three partners in one interaction) and rated on a scale from *not at all* (1) to *very much* (7) how supported they felt by their interaction partner/s and how satisfied they were with the outcome of the interaction. The teachers were able to report up to three interactions per half-day. If they did report more than one interaction, the mean ratings of support / satisfaction were calculated and used in the analyses.

Pleasant affect was assessed with three positive adjectives ('well', 'fresh' and 'serene') from the Multidimensional Mood Questionnaire (MDBF, Steyer et al., 1997). The participants indicated on a scale from *not at all* (1) to *very much* (5) how they felt "at this

moment”. McDonald’s Omega values (ω within = .76; ω between = .96) indicate reliability is satisfactory.

State work engagement was measured with three items (one from each of the subscales vigour, dedication and absorption) of the state version of the Utrecht Work Engagement Scale (Breevaart et al., 2012). The wording was adjusted from “today” to “during the past half-day”, e.g. “During the past half-day, I was enthusiastic about my work”. Participants could respond on a 7-point scale ranging from *strongly disagree* (0) to *strongly agree* (6). McDonald’s Omega within person was $\omega = .99$ and between persons $\omega = .93$.

Strategy of analysis

Because of the dependencies in the data we conducted multilevel analyses in Mplus 8.1 (Muthén & Muthén, 1998-2017). The intra-class correlations (ICCs) showed that there is significant within- and between-person variance in the variables that were measured with the daily diary (Table 1).

We estimated two-level models to test hypotheses 1–3. As our sample at the school level (15 schools) was too small to estimate three-level multilevel models, we specified two-level models (diary entries nested within teachers) while taking into account the clustering at the school level by using the sandwich estimator to compute standard errors of model parameters, which corrects for potential sampling differences (Muthén & Muthén, 1998-2017). To back up our results we also did each of these analyses using fixed effects models (Huang, 2014) i.e. two-level models with dummy variables for the different schools in the sample and then used post hoc contrasts to show that there are differences in the outcome variables in schools with high constructive vertical leadership versus low constructive

vertical leadership. The results of these analyses supported our results (not reported here, available on request from the authors).

To test hypothesis 4 we estimated multilevel mediation models with multilevel structural equation modelling (MSEM, 2-1-1 mediation model, see Preacher et al., 2010, p. 210). The predictor and mediator variables were centred at the grand mean. To test the significance of indirect effects we constructed 95% confidence intervals using Monte Carlo simulation procedures (Preacher & Selig, 2012).

Results

Descriptive analyses

On average, teachers experienced constructive vertical ($M = 3.77$, $SD = 0.37$) as well as constructive shared ($M = 3.60$, $SD = 0.52$) leadership behaviours between *once in a while* and *often* (see Table 1). The ICC of .01 for *constructive shared leadership* shows that almost all the variation in constructive shared leadership lies between persons and there are no systematic differences between schools. The ICC of .12 for *constructive vertical leadership*, on the other hand, suggests that 12% of the variations in constructive vertical leadership are attributable to the school level. This was expected, as teachers in a school all rated the same principal and supported the aggregation to a school mean.¹

Teachers reported, on average, 14 interactions ($M = 13.75$, $SD = 7.48$) during the diary phase or 0.75 interactions per half-day, which results in 741 diary entries with interaction records (of 1313 total). This data set was used for further analyses. In 72.7% of

¹ Please note that the estimation of the ICCs for the leadership variables is based on a twolevel model with a small sample (72 teachers within 15 schools). Simulation studies indicate downward bias in the estimation of level-2-variance with a small number of clusters (McNeish & Stapleton, 2016).

these diary entries, teachers reported one, in 20.9% two and in 6.3% three interactions. Most of these interactions (72.9%) were with one partner, 17.7% with two partners and 9.4% with three partners. Most partners were other teachers ($M = 12.35$, $SD = 7.60$), followed by parents ($M = 2.29$, $SD = 3.53$); principals ($M = 1.38$, $SD = 1.44$) and others ($M = 2.43$, $SD = 3.17$). It is interesting to note that teachers only reported very few interactions with the principal. Overall, teachers felt supported in the interaction ($M = 5.84$ on a 7-point-scale) and were satisfied with the outcome ($M = 5.96$, 7-point-scale).

Test of hypotheses

Hypothesis 1 states that constructive vertical and shared leadership are positively related to well-being. Results (Table 2) show that constructive vertical leadership is positively related to pleasant affect at work ($B = 0.22$, $SE = 0.10$, $p = .03$) and state work engagement ($B = 0.49$, $SE = 0.13$, $p < .01$), which means that teachers in schools with stronger constructive vertical leadership report more pleasant affect and higher state work engagement over the half-days. No such effects were found for constructive shared leadership. Therefore, results are in line with hypothesis 1 only for constructive vertical leadership.

Hypothesis 2 states that constructive vertical and shared leadership are positively related to interaction quality. Results show (Table 2) that constructive forms of vertical leadership are positively related to the experience of support in interactions ($B = 0.50$, $SE = 0.22$, $p = .02$) and the satisfaction with the outcome ($B = 0.48$, $SE = 0.13$, $p < .01$). Between-level variance of support in interactions was reduced by 13% and variance of satisfaction with the outcome by 22%. Teachers in schools with more pronounced constructive vertical leadership experience a higher interaction quality in terms of support and satisfaction

compared to teachers in schools with less pronounced constructive vertical leadership. No effects were found for shared leadership. These results are hence in line with hypothesis 2 only for constructive vertical leadership.

Hypothesis 3 states that interaction quality is positively related to well-being (pleasant affect and state work engagement). Results (Table 2) show that on the *within* person level, interaction quality (feeling supported by the interaction partner and satisfaction with the outcome) was related to pleasant affect (support: $B = 0.08$, $SE = 0.02$, $p < .01$; satisfaction: $B = 0.14$, $SE = 0.03$, $p < .01$) and state work engagement (support: $B = 0.13$, $SE = 0.04$, $p < .01$; satisfaction: $B = 0.18$, $SE = 0.04$, $p < .01$), such that on half-days with higher interaction quality teachers reported more pleasant affect and higher state work engagement. Therefore, results are fully in line with hypothesis 3 for the relationship of interaction quality and pleasant affect / work engagement.

When looking at the same relationship on the *between* person level, we see that interaction quality is related to pleasant affect (support: $B = 0.28$, $SE = 0.08$, $p < .01$; satisfaction: $B = 0.44$, $SE = 0.08$, $p < .01$) but not to state work engagement (support: $B = 0.27$, $SE = 0.23$, $p = .25$; satisfaction: $B = 0.56$, $SE = 0.29$, $p = .06$). That means that people who experience higher interaction quality over their workdays also report more pleasant affect compared to people with lower interaction quality, but this relation does not hold for state work engagement.

Hypothesis 4 states that the effect of vertical and shared leadership on state work engagement/pleasant affect is mediated through the experience of interactions. Because there was no relationship between constructive shared leadership and either interaction quality or well-being, we calculated the MSEM models to test for mediation effects only for

constructive vertical leadership (Table 3). Tests revealed one indirect effect, namely that the effect of constructive vertical leadership on pleasant affect is mediated by satisfaction with the outcome (indirect effect = 0.25; 95% CI [0.13, 0.39]). The direct effect of constructive vertical leadership on pleasant affect in this model was not different from zero ($B = -0.02$, $SE = 0.10$, $p = .87$), indicating that the effect was completely mediated through satisfaction with the outcome. Results are therefore only partly in line with hypothesis 4, as we found only one of four potential effects, namely for constructive vertical leadership (effect on pleasant affect via satisfaction with the outcome, but not via support in interactions) and not for constructive shared leadership.

Discussion

Using a daily-diary design, we investigated the relationship between constructive vertical and constructive shared leadership and characteristics of daily interactions of teachers at work and teachers' pleasant affect and state work engagement.

The results showed that teachers with principals rated higher on constructive leadership reported better overall interaction quality and higher levels of pleasant affect as well as higher levels of state work engagement over the half-days. Teachers' work engagement and pleasant affect fluctuated over the half-days, depending on the quality of the social interactions they experienced at work. Most of these interactions involved other teachers and only very few interactions involved direct contact with the principal. Constructive vertical leadership affects teachers' daily work-related well-being via the experience of positive interactions at work, but there are also other processes involved. Contrary to our expectations, we didn't find any of the expected effects for constructive shared leadership.

Shared leadership, social interactions and work-related well-being

Considering the particularities of schools as organizations (Scheerens, 2012), we expected shared leadership to be at least as important as vertical leadership in predicting teachers' interaction quality and well-being. In our sample, however, we did not find such effects of shared leadership. It is important to note that teachers did report experiencing shared leadership at their workplace. Although in the individual perceptions, shared leadership was present, (a) teachers belonging to the same school did not converge in their experience of shared leadership and (b) shared leadership was not connected to interaction quality and work-related well-being of teachers.

The finding that teachers from the same school didn't experience shared leadership in a similar manner is contrary to other studies (e.g. Pearce & Sims, 2002) that aggregated individual perceptions of shared leadership to the team level, as they view shared leadership as a property of the team. This approach has been criticized because "it generally positions shared leadership as deriving from an undifferentiated set of members and assumes convergence of attitudes among team members" (Zhu et al., 2018, p. 841). Moreover, most of these studies assessed shared leadership in teams, whereas in our study the participating teachers worked in the same school, but not necessarily in a team. Teachers tend to work together with colleagues who teach the same class or subject and so there could be many small teams in a school.

The absence of an effect of constructive shared leadership on interaction quality could also be because the small teams in which teachers work may differ regarding the extent of shared leadership. Unfortunately, we could not consider this in our recruitment strategy. Although it is likely that teachers report more interactions with those teachers they usually

work with (and had in mind when assessing shared leadership), they probably also reported interactions with other persons where effects of the shared leadership of their usual team could not be expected. Another reason for this unexpected result could be that maybe shared leadership is not as stable as we expected but rather a dynamic process (Drescher et al., 2014) that can best be grasped with daily assessments.

Furthermore, we found no relationship between shared leadership and work-related well-being, which was unexpected, as research has connected shared leadership to team members' well-being (Zhu et al., 2018). Most studies so far connected shared leadership with team outcomes (mostly team performance), though, rather than outcomes on the individual level. Maybe shared leadership is more important for task-related outcomes than for outcomes related to well-being. A recent study analysing effects of leadership training corroborates this assumption: increases in vertical leaders' transformational leadership were related to job satisfaction while increases in shared transformational leadership was related to efficiency (Tafvelin et al., 2019). Moreover, there are indications that the relationship between shared leadership and outcomes is especially strong when work is interdependent (Wang et al., 2014), which is less the case for teachers work (Scheerens, 2012).

Vertical leadership, social interactions and work-related well-being

Teachers with principals who have a more pronounced constructive leadership style reported more pleasant affect and state work engagement in their daily work life. The effect of vertical leadership on pleasant affect was mediated via *satisfaction with the outcome* of the interactions at work. Most of these interactions involved other teachers and teachers interacted with their principals rather infrequently. This result is in line with the work of Bono *et al.* (2007) who showed that employees of transformational leaders experience more

positive emotions during their workday, including in the course of interactions with their co-workers. Our study therefore sheds light on one of these indirect ways in which leader behaviour translates into employee outcomes. Given that the principal does not seem to have a high frequency of personal contacts with the teachers, he or she still has an effect on the way teachers interact and also on their work-related well-being. This effect presumably results from leaders' influence on organizational culture which leads to a positive work environment that includes collaboration, trust and positive social interactions (Ashkanasy & Humphrey, 2014; Diebig et al., 2017). This is in accordance with a study on principal's time use (Horng et al., 2010), that showed a relationship between the time principals spent on organisation management activities and positive school outcomes such as teachers' positive assessment of the school climate.

Our results also show an effect of constructive vertical leadership on state work engagement, but this effect is not mediated by the quality of the interactions. There must be other mediators unmeasured in our study, most likely other job resources, such as autonomy or day-level optimism (e.g. Breevaart et al., 2014; Tims et al., 2011).

Strengths and limitations

A strength of this study is its design, which combined a baseline questionnaire with a daily diary with two measurements per day over 10 working days. This allowed us to get close to teachers' daily experiences, minimize retrospective bias associated with more global assessments and consider within- and between-person processes (Bolger et al., 2003). Furthermore, we analysed all potential sources of leadership, as has been advocated by scholars in the field (Yammarino et al., 2012; Zhu et al., 2018) and with the distinction between vertical and shared leadership we drew upon an established concept. Also, we

focused on all the interactions at work and not just on those with the principal, to find out how they are influenced by perceived leadership and how they relate to daily outcomes.

Nevertheless, there are also a few limitations to be considered. First, our study was based only on a small sample at the school level, which limits the power and precluded us from calculating three-level models. However, to ensure the accuracy of our analyses, we controlled for the clustering in the data and backed up our results by calculating fixed effect models. Second, our sample was a convenience sample and therefore not fully representative of the target population, but as the main aim of the study was the investigation of processes, this is a minor concern. Third, we relied on self-reports of participants, which can introduce common source/method bias and inflate relationships between variables. As variables are not highly correlated and there are differential effects and because the measures of leadership and teachers' daily experiences were assessed at different points in time, we conclude that common source/method bias was not too pronounced. Combining our research design with assessments of daily shared and vertical leadership would allow the examination of how stable measures of leadership relate to daily variations in leadership behaviours and how both relate to daily outcomes. Regarding the assessment of shared leadership, it would be beneficial to study teacher cooperation in schools and enquire to what extent established structures and processes support cooperation between the teachers. If teams have been established, shared leadership should be studied on this level and connected to outcomes on the team level.

The quite intriguing finding of teachers reporting only very few interactions with their principal and, at the same time, finding effects of constructive vertical leadership on interaction quality and work-related well-being of teachers, merits further examination. It

would be interesting in future diary studies, to record *all* interactions with the principal of any duration, including meetings, to find out more about the process of leaders' influence on a positive work environment. Another promising approach would be to combine the teacher diaries with recordings of principals' time distribution on different tasks, e.g. with end of day logs (Sebastian et al., 2018). Further, we need to look at a longer time span, to understand how vertical leadership behaviours translate into improved collaboration or a good school climate that becomes evident in the good quality of social interactions at work.

Conclusions

Our study highlights the importance of vertical leadership in schools by showing that teachers with principals rated higher on constructive leadership experience better interactions, more pleasant affect and higher work engagement in their daily work life. This is relevant, as teachers' work can be challenging and job demands, such as high workload or pupil misbehaviour, lead to higher symptoms of burnout (Hakanen et al., 2006). But teachers' well-being is not only important in its own right, positive emotions of teachers also relate to student achievement (Tadić et al., 2013) and teachers' work engagement is positively related to classroom performance (Bakker & Bal, 2010). To provide a good learning environment for pupils and a good workplace for teachers, schools need to have good working conditions and resources that help teachers deal with day-to-day challenges (Simbula, 2010). Constructive leadership and supportive relations with co-workers are such resources. It is therefore crucial to have principals who lead constructively and encourage collaboration and positive relationships amongst their staff. Research shows that leadership development is effective at influencing positive outcomes (Kelloway & Barling, 2010).

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Table 1*Intraclass Correlations, Means and Intercorrelations for Study Variables*

Variable	ICC	1	2	3	4	5	6
1. Support in interactions (<i>T</i> =735)	.18	5.84 (1.18; 0.54)	.59**	.40**	.23	.11	.35**
2. Satisfaction with outcome (<i>T</i> =739)	.18	.60**	5.96 (1.11; 0.51)	.61**	.48**	.30*	.41**
3. Pleasant affect (<i>T</i> =736)	.24	.15**	.24**	3.66 (0.66; 0.37)	.47**	.10	.23
4. State work engagement (<i>T</i> =737)	.24	.15**	.20**	.41**	5.46 (1.00; 0.58)	.08	.30**
5. Constructive shared leadership	.01					3.60 (0.52)	.27*
6. Constructive vertical leadership school	.12						3.77 (0.37)

Note. Diagonal line contains the means on the between-level; standard deviations are shown in parentheses (within-level;between-level).

Intercorrelations at the within-level are in the lower diagonal and at the between-level in the upper diagonal. *N* = 72; *T* = number of half-days;

ICC = intraclass correlation coefficients (i.e. variance between persons for variables 1-4; variance between schools for variables 5/6); the

leadership variables (5/6) and the variable pleasant affect (3) were measured on 5-point scales; the other variables (1, 2 and 4) were measured on

7-point scales.

* $p < .05$; ** $p < .01$.

Table 2*Parameter Estimates of Multilevel Models*

H	Parameter	B (SE)	p-Value	ES
H1a	Constructive VL → Pleasant affect	0.22 (0.10)	.03	.06
	Constructive SL → Pleasant affect	0.03 (0.13)	.84	
H1b	Constructive VL → State work engagement	0.49 (0.13)	.00	.10
	Constructive SL → State work engagement	-0.01 (0.10)	.94	
H2a	Constructive VL → Support in interactions	0.50 (0.22)	.02	.13
	Constructive SL → Support in interactions	0.02 (0.17)	.92	
H2b	Constructive VL → Satisfaction with outcome	0.48 (0.13)	.00	.22
	Constructive SL → Satisfaction with outcome	0.21 (0.18)	.24	
H3a	Support in interactions → Pleasant affect	0.28 (0.08) _{between}	.00	.18
		0.08 (0.02) _{within}	.00	.03
	Satisfaction with outcome → Pleasant affect	0.44 (0.08) _{between}	.00	.38
		0.14 (0.03) _{within}	.00	.05
H3b	Support in interactions → State work engagement	0.27 (0.23) _{between}	.25	.07
		0.13 (0.04) _{within}	.00	.03
	Satisfaction with outcome → State work engagement	0.56 (0.29) _{between}	.06	.24
		0.18 (0.04) _{within}	.00	.04

Note. The table shows unstandardized estimates. $N = 72$; number of observations = 735–739. H = Hypothesis; VL = vertical leadership; SL = shared leadership; SE = standard error; ES = proportional reduction in variance in the outcome variable as an indicator of effect size.

Table 3*Unstandardized Path Coefficients and 95% Confidence Intervals for Indirect Effects of the Multilevel Mediation Models*

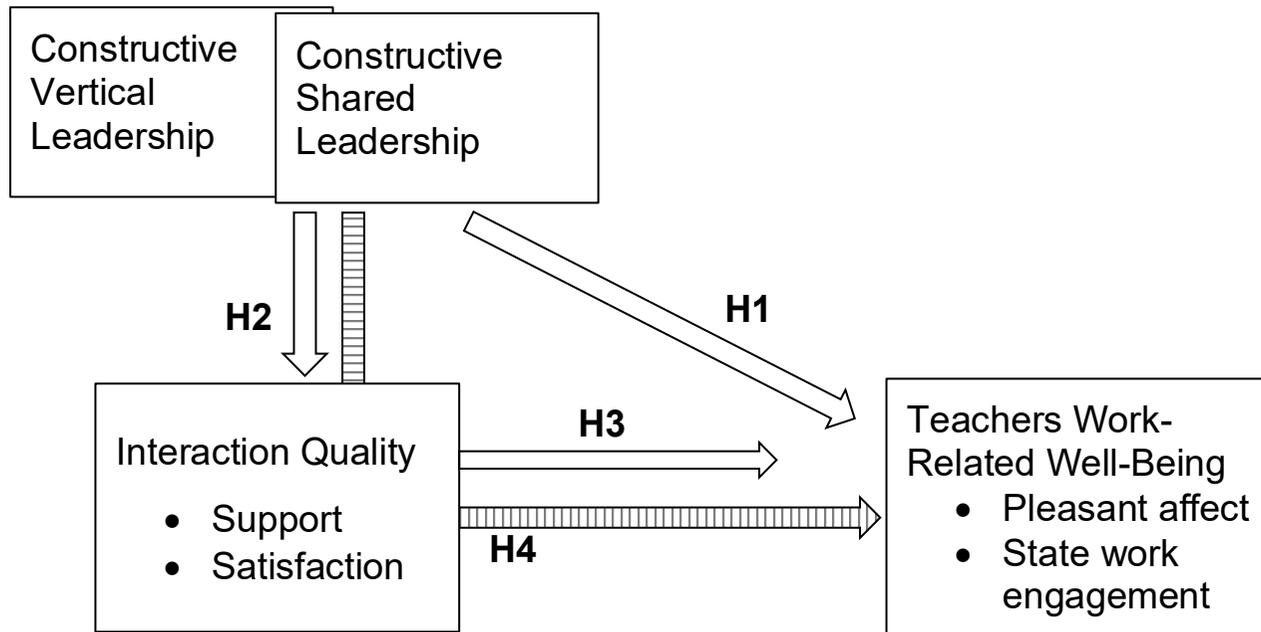
Hypothesis	Predictor	Mediator	Outcome	Path a _{between}	Path b _{between}	Indirect effect _{between}	95% Monte Carlo CI	
					Path b _{within}		LL	UL
H4a	Constructive vertical leadership	Support in interactions	Pleasant affect	0.50*	0.24*	0.12	-0.09	0.34
		Satisfaction with outcome		0.55**	0.08**			
H4b		Support in interactions	State work engagement	0.51*	0.15	0.08	-0.21	0.33
		Satisfaction with outcome		0.56**	0.13**			

Note. The table shows unstandardized estimates. $N = 72$; number of observations = 735–739. Path a coefficient represents the path between the predictor and mediator, Path b represents the path between the mediator and outcome. within = within persons (Level 1); between = between persons (Level 2). CI = confidence interval; LL = lower limit; UL = upper limit.

* $p < .05$; ** $p < .01$.

Figure 1

Theoretical Model of the Relationships between Constructive Vertical and Shared Leadership, Interaction Quality and Teachers Work-Related Well-Being.



Note. H = hypothesis

6.3 Study III

Effects of Leader Support on Team Social Resources and Work Engagement: Comparing Three Longitudinal Models

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This research was supported by Bern University of Teacher Education, PHBern, Switzerland, under Project Number 15 s 0003 02. We thank Laura Züger for her support in conducting the research.

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Abstract

To contribute to the understanding of the relationships between leader support, team social resources and work engagement, the current study compared three longitudinal models. The first model proposes direct effects of leader support on work engagement and effects of work engagement on team social resources. The second model proposes effects of leader support on team social resources and of team social resources on work engagement. The third model assumes effects of leader support on both variables, and a gain cycle between work engagement and team social resources. Data stems from a sample of employees (N = 684) from 113 extended education services in the German part of Switzerland who completed questionnaires at 3 timepoints (with lags of 6 months). Analyses with longitudinal structural equation modelling did not reveal any evidence for cross-lagged effects between the variables. Post-hoc exploratory analyses suggest that the time frame of the effects is probably quite short and therefore future studies should carefully consider which time intervals are best suited for the phenomenon at hand.

Keywords: leader support, work engagement, team social resources, longitudinal cross-lagged panel study

Effects of Leader Support on Team Social Resources and Work Engagement: Comparing Three Longitudinal Models

Employees who experience high levels of *work engagement* regularly feel energetic at work, are absorbed in their tasks and enthusiastic about what they do (Bakker & Leiter, 2011). This is beneficial to employees themselves, as work engagement has been related to individual outcomes such as job satisfaction or mental health. Moreover, having an engaged workforce is an advantage for the organization, as research shows positive consequences of work engagement, such as in-role and extra-role performance, commitment and lower turnover intentions (for an overview, see Borst, Kruijven, Lako, & Vries, 2020; Saks, 2019). It is not surprising, therefore, that a wealth of research in the last two decades examined antecedents of work engagement (Lesener, Gusy, Jochmann, & Wolter, 2019).

One important antecedent of work engagement is *leadership* (Carasco-Saul, Kim, & Kim, 2015). Leaders influence their employees' work engagement directly and indirectly via different pathways, such as social exchange or their influence on work characteristics (Decuyper & Schaufeli, 2020). Decuyper and Schaufeli (2020) proposed that positive leadership styles generally translate into similar leader behaviours in day-to-day work that influence employee work engagement. Some of these behaviours can be categorized as types of leader support, such as providing feedback to employees, showing interest for their well-being, being easily accessible or helping to solve problems (Paterson, Luthans, & Jeung, 2014; Stein, Vincent-Höper, & Gregersen, 2020).

A recent meta-analytic review of longitudinal evidence (Lesener et al., 2019) groups antecedents of work engagement into categories of resources at different levels, namely at the group-level, the leader-level, and the organization-level (see also Lee, Rocco, & Shuck,

2020, for an alternative taxonomy). We cannot assume that each resource influences work engagement independently, however, resources are related to one another in a network of mutual interactions. This is in line with conservation of resources (COR) theory, which proposes that “resources do not exist individually but travel in packs, or caravans, for both individuals and organizations” (Hobfoll, Halbesleben, Neveu, & Westman, 2018, p. 107). Leadership certainly has a special role in this “network of resources” and viewing leadership simply as a resource amongst many resources may be too simplistic. Leader-level resources, such as leaders providing support, can affect work engagement *directly* but also *indirectly* by shaping resources at the group or organizational level, such as creating a friendly and supportive work environment (House, 1996; Paterson et al., 2014).

Resources at the group level, which we term *team social resources*, include mutual support, teamwork, shared goals, and a friendly climate. Leader behaviours influence these team social resources (Robijn, Euwema, Schaufeli, & Deprez, 2020) and they affect work engagement, in turn (Halbesleben, 2011). At the same time, work engagement affects outcomes, such as increased contextual performance (Christian, Garza, & Slaughter, 2011) or organizational citizenship behaviour (Sulea et al., 2012), which are incorporated into team social resources. It is therefore unclear, which processes between supportive behaviours of leaders, team social resources and work engagement are more influential: direct effects of leader support on work engagement (and subsequently on team social resources) or indirect effects on work engagement via team social resources? These questions relate to the more general question of how leadership influences individual- and group-level variables and how these variables on the two levels interact (e.g. Chen, Kirkman, Kanfer, Allen, & Rosen, 2007).

The aim of this paper is therefore to contribute to the understanding of the processes between leader support and work engagement (Carasco-Saul et al., 2015; Xu & Cooper Thomas, 2011). Only when we understand these processes better, we can derive how leaders and organizations can contribute to high work engagement of their followers. To this end we compare three different process models of the effects of leader support on team social resources and work engagement (see Figure 1). The first model proposes effects of leader support on work engagement and, further, on team social resources. The second model proposes effects of leader support on team social resources and subsequent effects of team social resources on work engagement. The third model proposes simultaneous effects of leader support on both variables and a gain cycle between team social resources and work engagement. Since the majority of studies examining antecedents and consequences of work engagement are either cross-sectional or – when longitudinal – use a two-wave design (see Lesener et al., 2019 for an overview), conclusions about indirect and reciprocal effects are not possible (Dormann, Zapf, & Perels, 2010), so far. Using a three-wave longitudinal design this study properly tests the competing models.

Model 1: Direct Effects of Leader Support on Work Engagement and of Work Engagement on Team Social Resources

The first model proposes *direct effects* of leader support on work engagement through dyadic interactions of leaders with their followers and, subsequently, effects of individual work engagement on team social resources.

Leader Support and Work Engagement

Supportive leaders are easily accessible for their employees and interested in their well-being. They also provide frequent feedback. These behaviors are likely to contribute to a

good relationship between leader and follower and therefore to heightened feelings of belonging to the unit. These feelings of belonging satisfy the need for relatedness (Deci & Ryan, 2008), leading to intrinsic motivation, which can be expressed in increased work engagement (Kovjanic, Schuh, & Jonas, 2013; Schaufeli, 2015). Further, in dyadic interactions with a supportive leader, emotional contagion processes can play a role in influencing follower work engagement (Decuyper & Schaufeli, 2020). Positive affect of the leader, e.g. when he/she provides positive feedback can induce similar affect in the follower (van Knippenberg & van Kleef, 2016) and this positive affective state can influence work engagement directly. Ghadi, Fernando & Caputi (2013) explain the connection between (individual-focused) leadership and work engagement based on social exchange theory: Employees who receive important resources from their leaders, such as consideration, support and feedback, feel a sense of obligation for positive reciprocation, which can be realized in the form of engagement. Another study (Breevaart, Bakker, Demerouti, & van den Heuvel, 2015) links a high relationship quality between leader and follower to follower work engagement via increased developmental opportunities. An additional reason why leader support is related to thriving at work and high work engagement is the safe environment that is generated: in a safe environment employees are not afraid to try out things and take risks (Paterson et al., 2014). Furthermore, the relationship between leader support and work engagement can be explained by increased role clarity. Through the information, guidance and feedback that employees get from their leader, they are aware of what is expected and therefore know how to succeed in fulfilling their tasks, which leads to work engagement (Alarcon, Lyons, & Tartaglia, 2010).

Work engagement and Team Social Resources

Engaged individuals show enthusiasm, they feel inspired, energized, and proud of what they do. When individuals in such a state of mind cooperate with others in a team it is easy to imagine that this has an influence on other team members. Indeed, research shows that work engagement of individuals can cross over to other members in a team (Hobfoll et al., 2018; van Mierlo & Bakker, 2018). Further, individual work engagement relates to contextual performance (Christian et al., 2011; Sulea et al., 2012). This involves behaviours such as coaching co-workers or strengthening social networks that exceed fulfilment of the core work role and benefit co-workers and the organization as a whole. All these behaviours lead to higher team social resources. We therefore propose:

Hypothesis 1: There are positive time-lagged relationships between leader support and work engagement and between work engagement and team social resources

Model 2: Leader support – Team Social Resources – Work Engagement

The second model is based on the notion that generally leaders influence work engagement *indirectly*, by influencing contextual resources at work, that is, optimizing working conditions for their employees (Tuckey, Bakker, & Dollard, 2012).

Leader support and Team Social Resources

Supportive leaders are interested in the well-being of their employees, they provide feedback, and help to solve problems (Paterson et al., 2014; Stein et al., 2020). They are concerned with satisfying followers' needs and with creating a psychologically supportive and friendly work environment (House, 1996). Leaders providing support directly impact team social resources a) through being a role model, e.g., by supporting others and providing feedback they will stimulate such behaviours amongst followers (Sims & Manz, 1982), and b) by helping to resolve conflicts within the team. Research shows that supportive leadership

is associated with higher team cohesiveness (Wendt, Euwema, & van Emmerik, 2009) and with group-level helping behaviour (Tremblay, Gaudet, & Vandenberghe, 2019) and group organizational citizenship behaviour (Euwema, Wendt, & van Emmerik, 2007) which entails behaviours such as helping each other in the group and taking initiative within the group.

Team Social Resources and Work Engagement

Working in a team with high team social resources means that individuals provide each other emotional and instrumental support and perceive their work as effective and meaningful, as they work towards shared goals with their co-workers. These experiences are related to at least two of the three basic psychological needs, as described in self-determination theory (SDT, Deci & Ryan, 2008), namely the need for competence and relatedness. The satisfaction of these psychological needs is important for employees to flourish and is thereby related to work engagement (Kovjanic, Schuh, Jonas, van Quaquebeke, & van Dick, 2012; Robijn et al., 2020). Research has consistently related social support to work engagement (Christian et al., 2011; Halbesleben, 2011)

Based on these findings we propose:

Hypothesis 2: There are positive time-lagged relationships between leader support and team social resources and between team social resources and work engagement.

Model 3: A Gain Spiral Between Team Social Resources and Work Engagement

The third model proposes parallel effects of leader support on individual work engagement and on team social resources, hence combining evidence for models 1 and 2. Because we found evidence to back up both models presented so far, this could mean that both of these processes work simultaneously: Leaders influence individual followers in dyadic interactions and thereby have an effect on their work engagement. At the same time,

they influence team social resources through leader-group interactions. This leads to a parallel increase in team social resources and work engagement and to a gain spiral between these two entities. Gain spirals between resources are proposed in the conservation of resources theory (Hobfoll et al., 2018). It posits that when initial gains are made, future gains become more likely, because people can invest available resources to gain more resources. It also posits that resources do not exist individually but travel in “resource caravans”.

Employees with high work engagement contribute to team social resources via higher contextual performance, that is, by doing more things beyond their formal job description and “will be more likely to create a social context that is conducive to teamwork, helping, voice, and other important discretionary behaviors” (Christian et al., 2011, p. 124). Working in a team with high social resources, in turn, contributes to individual work engagement because employees’ feelings of relatedness, of being effective increase their intrinsic motivation (Kovjanic et al., 2013) . These processes between team members can also be described in terms of crossover of psychological states, or resources (Hobfoll et al., 2018) from one team member to the other. Several studies provide empirical evidence of such gain spirals between job resources and work engagement (Weigl et al., 2010) and also between work engagement and personal initiative (Hakanen, Perhoniemi, & Toppinen-Tanner, 2008), or between job resources, personal resources such as hope or optimism and work engagement (Reis, Hoppe, & Schröder, 2015, see also Salanova, Schaufeli, Xanthopoulou, & Bakker, 2011). Based on these findings, we propose:

Hypothesis 3: There is a positive time-lagged relationship between leader support and work engagement and between leader support and team social resources, and reciprocal time-lagged relationships between work engagement and team social resources.

Method

Study Design

Data were collected as part of a research project on working conditions in extended education (out-of-school time programs, such as lunchtime or afterschool care; Windlinger & Züger, 2020). With the aim of sampling 25% of all the extended education services in three German speaking Swiss cantons we stratified the list of all services by canton and type of service. We then approached the heads of the extended education services in random order to ask whether they were willing to participate in our study. When a service was not ready to participate, the next one on the list was contacted. Participating heads of services sent us postal or e-mail-addresses of their team members, depending on individual preferences regarding online or paper-and-pencil format. Each participant was assigned a personal ID code to pseudo-anonymize the data. Data were collected at three measurement occasions between October 2017 and December 2018 with time lags of 6 months.

Participants

Participants were affiliated with 113 extended education services (28% of all existing services at time of recruiting) in three Cantons of Switzerland. These services provide care for school children outside regular school hours, with a focus on supervised recreation as well as development of social competencies (Schübach, 2019). All services provided at least lunchtime care (including lunch) and most offered after-school and before-school care. 50 services provided full-time service (before-school, lunchtime, and after-school care on five days a week) and the other 63 services provided part-time service.

The sample of this study ($N = 684$) consisted of 10.2% male and 84.5% female employees (5.4% did not indicate their gender) with a mean age of $M = 43.25$ years, $SD =$

13.42 at the first measurement (T1). 24.7% were qualified teachers, 28.1% had another educational qualification such as a vocational level diploma in childcare and 46% had a qualification outside education. The majority were employed part-time in extended education, with working hours of $M = 16.2$ hours per week, $SD = 12.7$ and 43% of the employees had a second job (14% as teachers).

To test for attrition bias in the study sample, we compared participants who participated in all three measurement waves (“stayers”; $N = 418$) with those who dropped out after the first or the second wave (“dropouts”; $N = 237$; note that there were 29 participants who had not participated in T1, that is why the total sample size is 684). Men were more likely to drop out than women, $\chi^2(1, N = 648) = 8.34, p < .01$. Dropouts were slightly younger ($M = 41.73, SD = 14.04$) than stayers ($M = 44.09, SD = 13.00$); $t(443.09) = -2.09, p < .05$. Further, levels of work engagement were lower for dropouts ($M = 5.04, SD = 1.09$) than stayers ($M = 5.34, SD = 0.97$), $t(403.88) = -3.43, p < .01$. There were no differences between the two groups regarding their perception of leader support, $t(631) = 0.10, ns$; or team social resources, $t(633) = -0.17, ns$. The differences between dropouts and stayers did not exceed one-third standard deviations, however, and can probably be neglected when interpreting results.

Measures

All the measures were administered in German at all three measurement occasions (T1, T2, and T3). All variables were modelled as latent variables with multiple indicators. McDonalds omega (ω) is reported as a measure of composite reliability (Hayes & Coutts, 2020)

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Leader support was assessed with 3 items from Udris & Riemann (1999) and 2 items from Grebner, Graf, Alvarado, Berlowitz, & Cassina (2010), sample item: “The leader is interested in the well-being of his/her subordinates”. The answer scale ranged from *not at all* (1) to *very much* (5). Reliability was high with T1 $\omega = .989$; T2 $\omega = .996$; T3 $\omega = .998$.

Team social resources were measured with 6 items from Schreyer et al. (2014) (“We collaborate effectively as a team”), the answer scale ranged from *not at all* (1) to *very much* (5). Reliability was good with T1 $\omega = .896$; T2 $\omega = .919$; T3 $\omega = .919$.

Work engagement was measured with 9 items from the Utrecht Work Engagement Scale (Schaufeli & Bakker, 2003; e.g. “I feel happy when I am working intensely”), the answer scale ranged from *never* (1) to *always* (7). Means of the three subscales (vigour, dedication, and absorption) served as indicators of the latent variable. Reliability was high with T1 $\omega = .932$; T2 $\omega = .939$; T3 $\omega = .937$.

Working hours at T1 (average working hours per week) was used as a control variable because the majority of employees in extended education are employed part-time and there is high variability in the study sample regarding working hours. The amount of time spent at work is likely to influence the experience of work engagement or the perception of leader support and team social resources (Thorsteinson, 2003).

Analytic Strategy

We conducted confirmatory factor analyses (CFA) and structural equation modeling (SEM) analyses using Mplus Version 8.4 (Muthén & Muthén, 1998-2017) in several steps: First, we estimated longitudinal CFAs for the three constructs that were then combined into a measurement model and the measures were tested for invariance across time (Little, 2013). Next, we tested a series of autoregressive, cross-lagged panel models (a stability model with

only autoregressive paths, followed by models 1, 2 and 3 as described in the hypotheses). Each model was tested first (a) without and then (b) with equality constraints for the correspondent autoregressive or cross-lagged paths to test whether the relationship between the variables is the same between T1 and T2 as between T2 and T3 (Kleinke, Schlüter, & Christ, 2017, p. 127).

We used full information maximum likelihood (MLR) estimation together with type = complex in Mplus to deal with missing values and non-normality of data as well as non-independence, as our participants were nested within 113 organizations (Muthén & Muthén, 1998-2017). As recommended for longitudinal SEM, error terms of indicators were allowed to covary with the corresponding indicators at the other time points and the latent variables (respectively their residuals) were allowed to covary at each time point. Satorra-Bentler scaled chi-squared difference tests were used to compare nested models (Newsom, 2015). To assess model fit, we used conventional cut-off values (Hu & Bentler, 1999) to indicate good (adequate) fit: for the comparative fit index (CFI) and Tucker-Lewis index (TLI), values $\geq .95$ ($\geq .90$), and for the root mean square error of approximation (RMSEA) values $\leq .06$ ($\leq .08$).

Results

Descriptive statistics

Descriptive statistics and correlations between the study variables are shown in Table 1. Leader support was rated as fairly high and team social resources as good, with means > 4 on five-point scales. On average, participants reported to “often” feel engaged at work, although there is high variability in these measures, as indicated by the relatively high standard deviations. Correlations between these three variables were in the expected direction

and the correlations between the same variables at different times were high. Working hours correlated positively with work engagement and negatively with leader support and team social resources. The positive correlation with work engagement could be due to a greater task variety (Christian et al., 2011). Compared to employees who work longer hours and interact with the children in diverse settings during their working days, employees who only work few hours often cover lunchtime sessions, which means mainly supervising children during their lunch. Employees with less working hours probably enjoy the social exchange with their leader and the team during their shifts and therefore assess leader support and team social resources more positively than employees who work longer hours and are therefore also more affected by conflicts or leadership quality.

Measurement Models

The measurement model with the three latent variables at T1, T2 and T3 showed a good fit with the data (see Table 2, configural invariance model). All standardized factor loadings were $> .67$. To test for measurement invariance across the three waves, we first constrained factor loadings to be equal for T1, T2 and T3 (weak factorial invariance model). Next, we also constrained factor variances to be equal over time (strong factorial invariance model). As neither of these steps decreased model fit significantly, strong factorial invariance was achieved for all constructs, which means that the variables measure the same underlying construct across time.

Structural Model

As a first structural model, we estimated a stability model (M0a) with autoregressive paths for each latent variable between T1 and T2 as well as T2 and T3. The model fitted the data well. Rank order stabilities over time were highest for work engagement (first time lag:

$\beta = .83; p < .001$; second time lag: $\beta = .85; p < .001$), and also relatively high for team social resources (first time lag: $\beta = .71; p < .001$; second time lag: $\beta = .72; p < .001$) and leader support (first time lag: $\beta = .69; p < .001$; second time lag: $\beta = .73; p < .001$). This indicates that the relative differences between individuals in the assessment of these three constructs are quite stable. Constraining the autoregressive paths of the stability model to be equal over time (M0b) did not decrease model fit compared to the less restrictive model (see Table 2).

Model 1

The first model was based on the stability model and cross-lagged paths from leader support to work engagement and from work engagement to team social resources were added (M1a). The model fit did not decrease when equality constraints for the cross-lagged paths were added (M1b, see Table 2). None of the cross-lagged paths were significant (leader support to work engagement, first time lag: $\beta = -.02; p = .26$; second time lag: $\beta = -.03; p = .26$; work engagement to team social resources, first time lag: $\beta = .00; p = .90$; second time lag: $\beta = -.00; p = .90$). The model did not present a better fit to the data than the stability model (see Table 2). Therefore, hypothesis 1 was not supported.

Model 2

The second model was also based on the stability model and cross-lagged paths from leader support to team social resources and from team social resources to work engagement were added (M2a) and then constrained to be equal over time (M2b). There were no significant effects from leader support to team social resources (first time lag: $\beta = .03; p = .35$; second time lag: $\beta = .03; p = .36$) or from team social resources to work engagement (first time lag: $\beta = .01; p = .72$; second time lag: $\beta = .01; p = .72$) and the model did not fit

better to the data than the stability model (see Table 2). Therefore, hypothesis 2 was not supported.

Model 3

The third model (M3a) was a combination of the first and second models as it contained cross-lagged paths from leader support to work engagement, from leader support to team social resources and reciprocal paths between work engagement and team social resources. As in the other models, constraining paths to be equal over time did not decrease model fit (M3b). In this model, none of the cross-lagged paths were significant and the model did not fit better to the data than the stability model (see Table 2). Hence, hypothesis 3 was not supported.

Working Hours as a Control Variable

All three models were also calculated including working hours at T1 as a control variable. The model fit was a little lower, but still adequate with $\chi^2(856)=1699.32$ $p < .001$, CFI=.943, TLI=.940, RMSEA=.040 for Model 1; $\chi^2(856)=1698.53$ $p < .001$, CFI=.943, TLI=.940, RMSEA=.040 for Model 2; and $\chi^2(854)=1697.65$ $p < .001$, CFI=.943, TLI=.940, RMSEA=.040 for model 3. Working hours was positively related to work engagement ($\beta = .11$; $p < .05$) and negatively to team social resources ($\beta = -.21$; $p < .001$) and leader support ($\beta = -.10$; $p < .05$; see also paragraph “Descriptive statistics”). The inclusion of the control variable in the models did not affect any of the other associations in the models.

Discussion

The aim of this study was to contribute to the understanding of the relationships between leader support, team social resources and work engagement. To this end, we compared three different longitudinal models that represent different pathways of how leader

support affects team social resources and work engagement. The variables were quite stable over time (autoregressive effects) and in none of the three models we found any evidence for cross-lagged effects between the study variables. There are several possible explanations for these results. The most obvious reason would be, that the variables are indeed not related. Maybe other resources rather than leader support or team social resources are more important for work engagement. While the meta-analytic review of Lesener et al. (2019) found evidence that job resources at the leader-level and the group-level did contribute to work engagement over time, they also found that organizational-level resources (such as autonomy or role clarity) had the strongest impact. Other studies as well – like the present one – did not find any cross-lagged relations, e.g. between supervisor and co-worker support and work engagement (Biggs, Brough, & Barbour, 2014) or the effects were only significant when the baseline level of work engagement was not included in the model (Mauno, Kinnunen, & Ruokolainen, 2007). This leads to another possible explanation for our findings: in our study the variables all showed high stabilities over time. This is common in longitudinal research (Lesener et al., 2019) and can be a reason for finding only small or no cross-lagged effects, as there is not much variance to be explained by other variables (Kinnunen & Feldt, 2013).

Another issue directly related to the stabilities of the variables is the time lag between measurement waves (Dormann & Griffin, 2015). A reason why we did not find any relations between our variables over time could be our choice of a time lag of 6 months between the measurement waves. It is possible that the hypothesized effects develop over a shorter time span and are therefore not detected with longer time intervals (Finkel, 2008). For instance, a longitudinal study by Reis et al. (2015) only found mutual relations between resources over a shorter time lag of 10 weeks, but not over 5 months. When we study processes, we assume

that they unfold over time, but often we do not have enough evidence about the timeframes of such processes (Mitchell & James, 2001; Spector & Meier, 2014). Reviews about longitudinal processes are helpful (e.g. Mäkikangas, Kinnunen, Feldt, & Schaufeli, 2016) but the temporal perspective also has to be integrated into theoretical models (Sonnentag, 2012). Because the absence of cross-lagged effects in our study does not indicate that there is no relationship between the variables, we conducted some post-hoc exploratory analyses to find out whether synchronous relationships between the variables were present.

Post-Hoc Exploratory Analyses

Testing for synchronous effects in a longitudinal model has advantages over testing synchronous relationships with a cross-sectional design. Because the stability (autoregressive) effects are included in the model, the synchronous effects at T2 and T3 can be interpreted as the effects of change in one variable on the magnitude of change in the other variable (Finkel, 2008; Laurijssen & Glorieux, 2013). While not sufficient, it makes causal interpretation of these effects much more plausible than in cross-sectional models (Dormann et al., 2010, p. 975).

To test for synchronous effects between the study variables, we took the same steps as for the models with lagged effects. Each model was based on the stability model which includes autoregressive paths for each latent variable between T1 – T2 and T2 – T3. Instead of modelling the lagged effects, we now included synchronous paths within T2 and within T3 (in model 1 paths from leader support to work engagement and from work engagement to team social resources; in model 2 paths from leader support to team social resources and from team social resources to work engagement; in model 3 paths from leader support to work engagement and to team social resources plus reciprocal paths between team social

resources and work engagement). For all models, constraining paths to be equal over time did not decrease model fit (see Table 3). The comparison of the three models revealed that model 3 showed the best fit to the data (significantly better than the other models, see Table 3).

Standardized coefficients for the paths from leader support to work engagement were $\beta = .07$; $p < .05$ at T2; $\beta = .07$; $p < .05$ at T3; from leader support to team social resources $\beta = .29$; $p < .001$ at T2; $\beta = .26$; $p < .001$ at T3 and from team social resources to work engagement $\beta = .07$; $p < .05$ at T2; $\beta = .08$; $p < .05$ at T3. The reverse paths from work engagement to team social resources were not significant ($\beta = .01$; $p = .77$ at T2; $\beta = .01$; $p = .77$ at T3). These results suggest that (an increase in) leader support has immediate effects on both work engagement and team social resources and team social resources also relate to concurrent work engagement.

Strengths, Limitations and Directions for Further Research

The main strength of this study lies in its longitudinal design with three measurement waves, which allows to properly test indirect and reciprocal effects (Dormann et al., 2010). In addition, with our analytic approach with the use of latent variable longitudinal SEM, we controlled for measurement error. This approach made it possible to compare different models of the processes between leader support, team social resources, and work engagement in one study.

This said, we also have to mention some limitations. First, the study used self-report data that were collected with the same method, at the same time point, and from the same source which could have inflated associations. As we made sure through testing the measurement models that the constructs are distinct, this should be a minor concern.

Nevertheless, it would be interesting to get recordings of leaders' supportive behaviours (e.g. with daily logs) to have a more objective measure of leader support

Another limitation is that our sample stems from the field of extended education with a big proportion of female participants and it is therefore unclear to what extent the results can be generalized to other occupational groups. Furthermore, the analysis for attrition bias showed that participants with lower work engagement were more likely to drop out. Future research should be conducted with more heterogeneous samples or in other types of organizations. Finally, the most important limitation of our study is the time lag between the measurement waves. In order to plan optimal time intervals for measurement waves in future studies, we need more precise theoretical models that take time into account (Sonnentag, 2012). Furthermore, pilot studies with "shortitudinal designs" (Dormann & Griffin, 2015) should be conducted. Including multiple waves with shorter time intervals will maximize the chances of including the interval between the study waves that corresponds to the "real" time lag of the effect (Taris & Kompier, 2014).

Conclusion

The present study tested three different models representing different relationships between leader support, team social resources, and work engagement. As the longitudinal models did not provide any evidence for cross-lagged relations between the variables and evidence for synchronous effects stems only from post-hoc exploratory analyses, it is difficult to draw any firm conclusions with regards to content. Conclusions can be drawn regarding future research into the topic at hand such that researchers should carefully match interval length with the phenomenon to be examined.

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Table 1*Means, Standard Deviations, and Correlations between the Study Variables*

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. working hours	16.21	12.72									
2. leader support T1	4.26	0.72	-.09*								
3. team social resources T1	4.31	0.58	-.20**	.48**							
4. work engagement T1	5.23	1.02	.10*	.35**	.33**						
5. leader support T2	4.12	0.80	-.14**	.65**	.43**	.31**					
6. team social resources T2	4.18	0.69	-.25**	.36**	.69**	.27**	.54**				
7. work engagement T2	5.19	1.02	.06	.28**	.30**	.78**	.34**	.32**			
8. leader support T3	4.10	0.79	-.08	.65**	.45**	.33**	.70**	.43**	.36**		
9. team social resources T3	4.14	0.73	-.18**	.34**	.63**	.25**	.39**	.69**	.24**	.47**	
10. work engagement T3	5.11	1.04	.02	.27**	.27**	.75**	.31**	.32**	.80**	.40**	.32**

*Note.** $p < .05$; ** $p < .01$.

Table 2*Goodness of Fit Statistics for the Measurement Models and the Longitudinal SEM Models*

Models	Model fit				Model comparison ^a	
	χ^2 (df)	CFI	TLI	RMSEA	Model	$\Delta\chi^2$ (df)
Measurement models						
a: Configural invariance model	1297.51 (752)	.964	.959	.033		
b: Weak factorial invariance model	1326.72 (774)	.964	.960	.033	b vs a	30.19 (22)
c: Strong factorial invariance model	1349.29 (792)	.964	.961	.032	c vs b	31.53 (18)
Structural models						
M0a: Stability model	1445.98 (813)	.959	.956	.034		
M0b: Stability model (cons.)	1446.06 (861)	.959	.957	.034	M0b vs M0a	1.66 (48)
M1a: Model 1	1442.86 (809)	.959	.956	.034		
M1b: Model 1 (cons.)	1444.62 (814)	.959	.957	.034	M1b vs M1a	2.85 (5)
					M1b vs M0b	1.08 (47)
M2a: Model 2	1445.40 (809)	.959	.956	.034		
M2b: Model 2 (cons.)	1445.34 (814)	.959	.957	.034	M2b vs M2a	1.58 (5)
					M2b vs M0b	1.09 (47)
M3a: Model 3	1441.55 (805)	.959	.956	.034		
M3b: Model 3 (cons.)	1443.15 (812)	.959	.956	.034	M3b vs M3a	3.11 (7)
					M3b vs M0b	2.79 (49)

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; cons. = constrained: model

with equality constraints for the correspondent autoregressive or cross-lagged paths (between T1 and T2 and T2 and T3).

^a Models were compared using the Satorra-Bentler-Scaled chi-square difference statistic.

Table 3*Goodness of Fit Statistics for the Longitudinal SEM Models with Synchronous Paths*

Models	Model fit				Model comparison	
	χ^2 (df)	CFI	TLI	RMSEA	Model	$\Delta\chi^2$ (df)
M1a: Model 1	1602.62 (815)	.949	.946	.038		
M1b: Model 1 (cons.)	1603.45 (820)	.949	.946	.038	M1b vs M1a	2.83 (5)
M2a: Model 2	1533.89 (815)	.953	.951	.036		
M2b: Model 2 (cons.)	1534.97 (820)	.953	.951	.036	M2b vs M2a	2.83 (5)
M3a: Model 3	1527.95 (811)	.953	.950	.035		
M3b: Model 3 (cons.)	1528.69 (818)	.954	.951	.036	M3b vs M3a	3.29 (7)
					M3b vs M1b	43.09 (2) **
					M3b vs M2b	6.47 (2) *

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; cons. =

constrained: model with equality constraints for the correspondent autoregressive paths (between T1 and T2 and T2 and T3) or the correspondent synchronous paths (within T2 and T3).

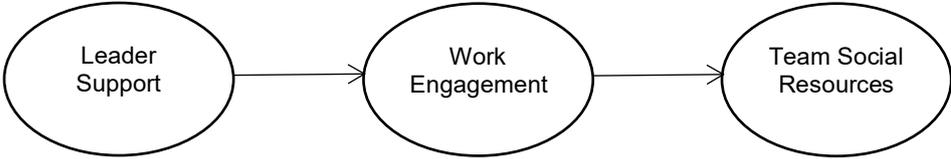
^a Models were compared using the Satorra-Bentler-Scaled chi-square difference statistic.

* $p < .05$; ** $p < .01$.

Figure 1

The three models

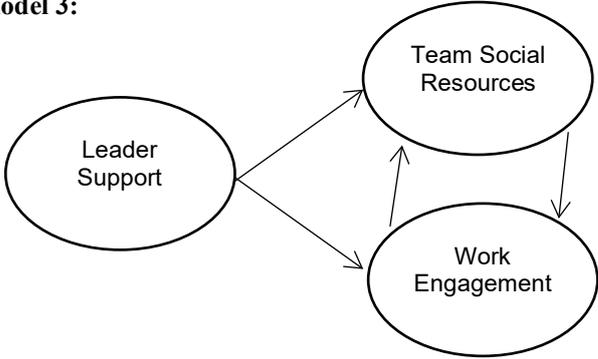
Model 1:



Model 2:



Model 3:



Appendix

Declaration of authorship

I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where stated otherwise by reference or acknowledgment, the work presented is entirely my own.

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Münsingen, 26.02.2021

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