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

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

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Introduction

Transformational leadership (TL) shapes teachers' professional attitudes, practices, and outcomes in various ways, thereby indirectly affecting student achievement (e.g. Chin 2007; Leithwood and Sun 2012). Sun and Leithwood (2017, 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 and Scheerens 2013; Marzano, Waters, and McNulty 2005). Robinson, Lloyd, and Rowe (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 and 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

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represent either (*disaggregated*) scores for each staff member or *aggregated* constructs for an organisational entity (Wang and 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 and McLaughlin 2006) as well as in research into principals' options, constraints and choices of action (e.g. Brauckmann and 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 and McLaughlin 2006). From the multitude of such conditions, we examine principals' span of control,[1] because an increase in staff numbers per principal

[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 evidence about school size. Moreover, related research

reduces staff members' opportunities to interact with and observe their supervisor (Schyns, Maslyn, and van Veldhoven 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 and Shamir 2013), a distant situation might diminish the leader's impact on followers (Gumusluoglu, Karakitapoğlu-Aygün, and Hirst 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.

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mostly focuses on student learning, which is a qualitatively different outcome variable than teacher efficacy.

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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 and Riggio 2006). They exert influence by 'heightening followers' 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, 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 and Gray 2006b). Four complementary TL dimensions are proposed to establish these connections (Bass and 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 and Sun 2012; Marzano, Waters, and McNulty 2005). These effects are likely mediated by a

range of school and teacher characteristics (Hendriks and 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 and 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, 3), efficacy beliefs among teachers pertain to coping successfully with the professional demands of enhancing students' academic progress and personal growth (Klassen and Tze 2014). However, these beliefs can draw on either individual or group capabilities to master these demands (Ware and 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 and Gray 2006b, 182), whereas group-referential efficacy beliefs (*collective efficacy*) reflect teachers' shared perceptions of their conjoint capability to foster student learning through concerted actions (Goddard, Hoy, and Hoy 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 and 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 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, Payette, and Leroux 2008; Ross and Gray 2006a, 2006b);
- individual *teacher efficacy*, either with all measures reflecting individual perceptions of staff members (Runhaar, Sanders, and Yang 2010), or with measures aggregated entirely to the school level (Nir and 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, Duyar, and Çalik 2011).

[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.

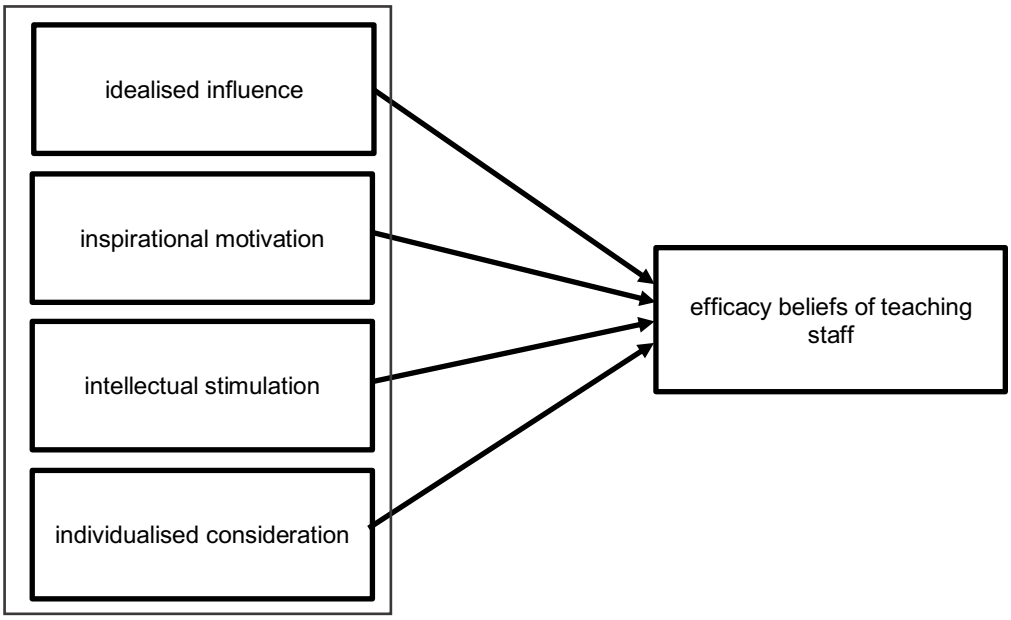

Figure 1. Basic model design.

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 and Shamir 2013; Tse and Chiu 2014; Wang and 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, Bruch, and

Shamir 2009; Kark and Shamir 2013, 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 and Chiu 2014). *Intellectual stimulation* refers to encouraging staff members to be adventurous, inventive and creative in handling tasks (Bass and 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 (Wang and 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 and Shamir 2013, 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 and Shamir 2013; Wang and 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, Hoy, and Hoy 2004; Walumbwa et al. 2004).

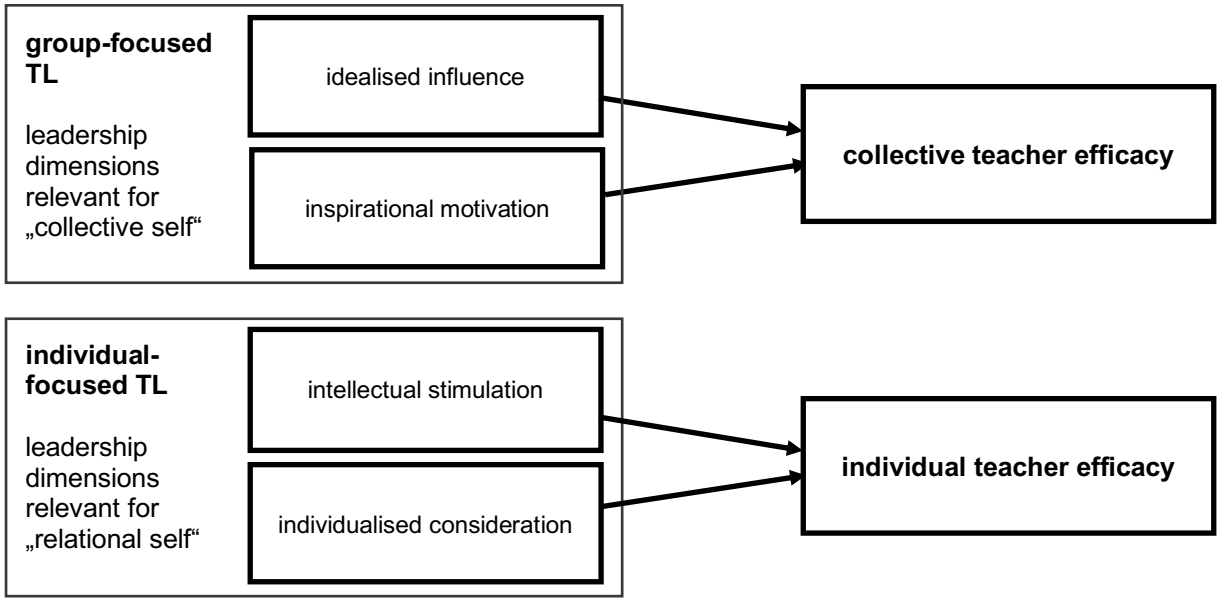

Figure 2. Dual effects model design.

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 (Wu, Tsui, and Kinicki 2010; Tse and Chiu 2014), 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 and 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, Maslyn, and van Veldhoven 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, Bruch, and Shamir 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. 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, Maslyn, and van Veldhoven 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, Karakitapoğlu-Aygün, and Hirst 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 and 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, Bruch, and Shamir 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.

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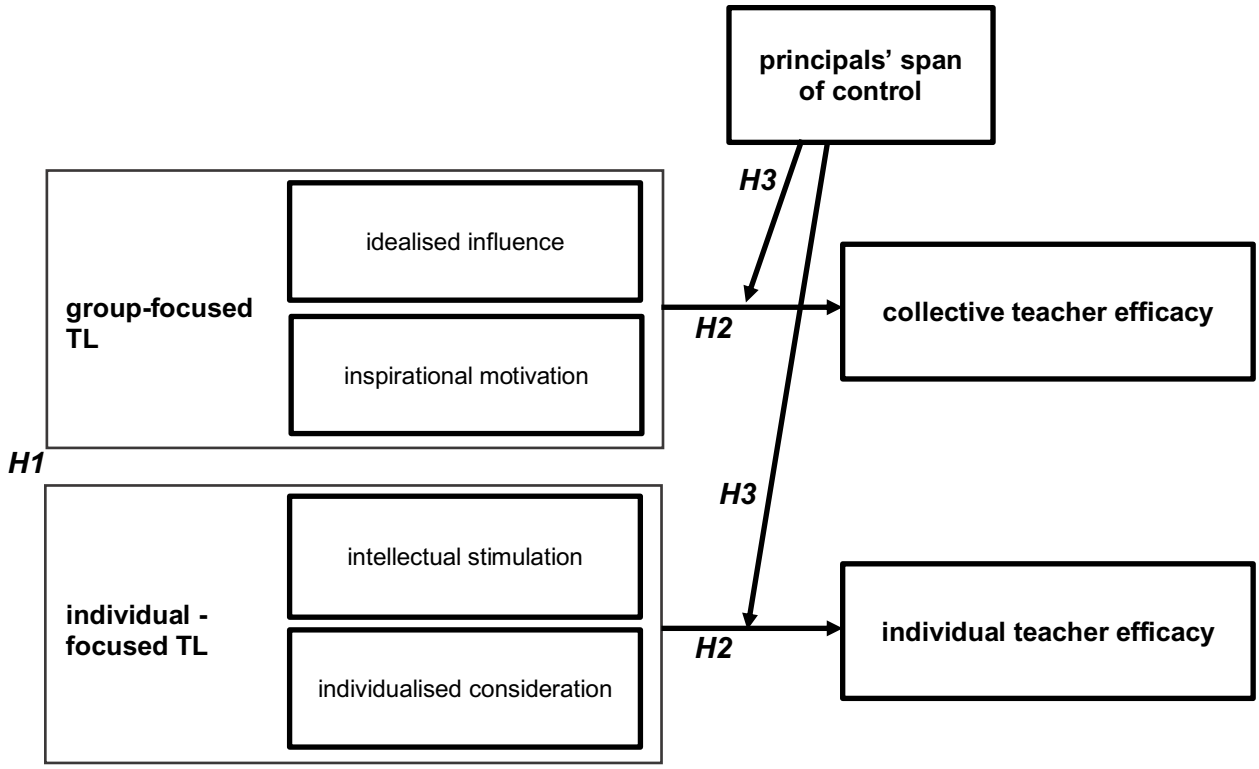

Figure 3. Dual effects model with moderator variable.

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, and Kirchhofer 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, and Kirchhofer 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 and Avolio 1995). Items were sorted into individual- or group-focused categories according to theoretical reasoning (Kark and Shamir 2013; Wang and 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 and 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, Vermunt, and Rutte 2008), 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.

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Statistical procedure

In order to avoid problems resulting from aggregation or disaggregation strategies (Heck and 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 and 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 and 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. 2006, 218), the average deviation index ADM (Burke and 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 and Thomas 2015; Hu and Bentler 1999): comparative fit index (CFI) and Tucker-Lewis index (TLI) values ≥ .95 (≥ .90), root mean square error of approximation (RMSEA) values ≤ .06 (≤ .08), and standardised root mean square residual (SRMR) values ≤ .05 (≤ .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^2difference 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 ≥ .58.

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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

Notes. ** = p < .01; 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

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).

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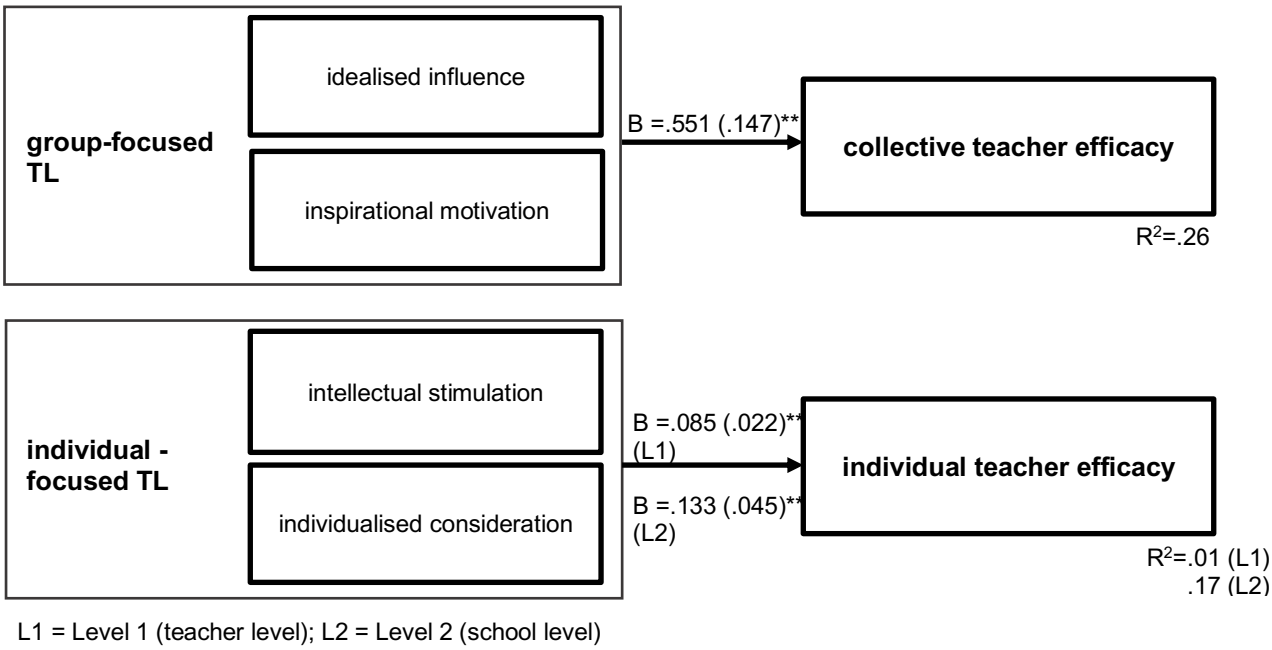

Figure 4. Dual effects model of principals' TL behaviours and teachers' beliefs of individual and collective efficacy.

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%.

Windlinger, Regula; Warwas, Julia; Hostettler, Ueli (2019). *Dual effects of transformational leadership on teacher efficacy in close and distant leadership situations.* School Leadership and Management, pp. 1-24. Carfax International Publishers 10.1080/13632434.2019.1585339

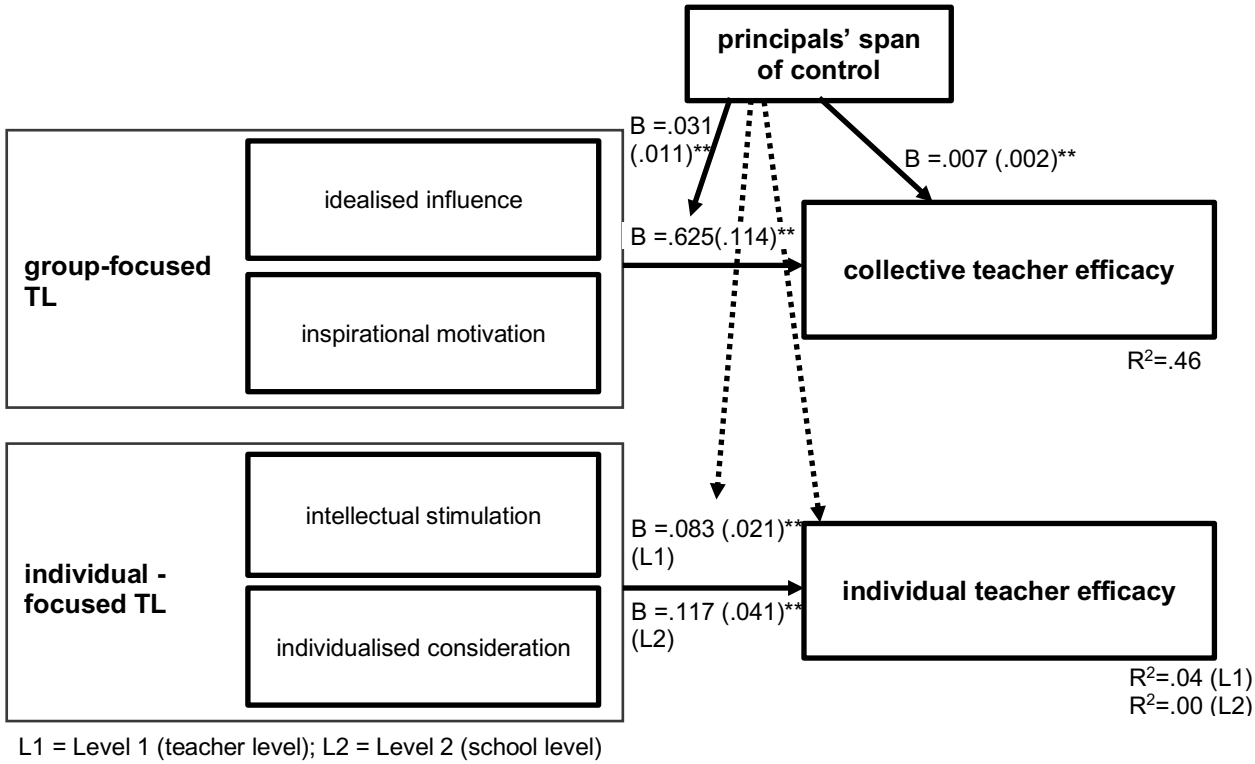

Figure 5. Moderated dual effects model with principals' span of control as a moderator.

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*.

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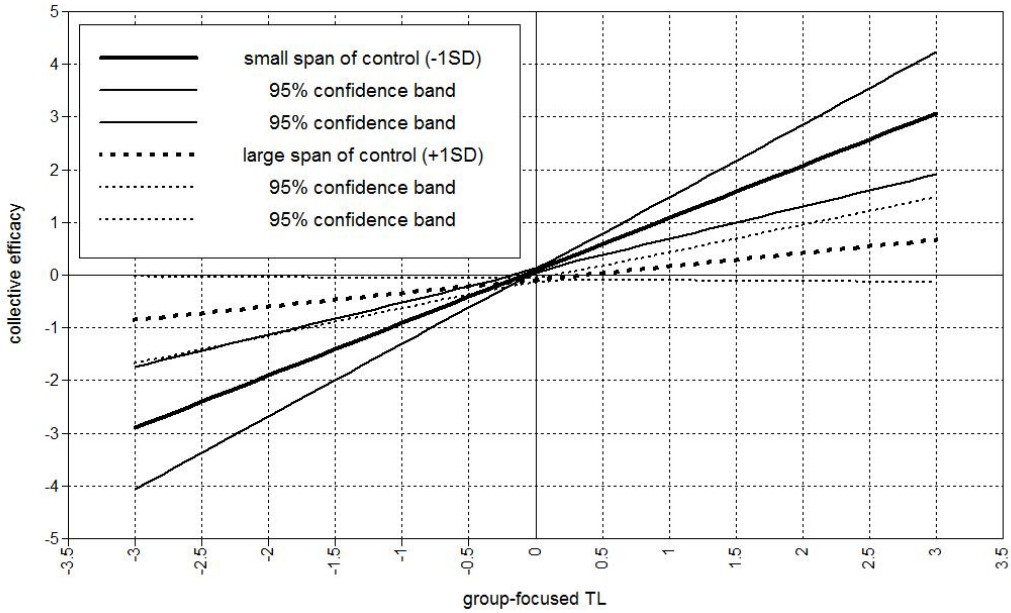

Figure 6. Interaction effect of principals' span of control and TL on collective teacher efficacy

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 and 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

- 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 and 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, Tsui, and Kinicki 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, Hoy, and Hoy 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, Tsui, and Kinicki 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, Roth, and Oliveira 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 and 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.

Disclosure statement

No potential conflict of interest was reported by the authors.

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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

	#	Sample Item	M	SD	α	ωw ωb	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

Notes. # = Number of items, M = Mean, SD = Standard deviation, α = Cronbach's Alpha, ωw/ωb = McDonalds' Omega within/between, ICC(1) = Intra-Class-Correlation 1, ICC(2) = Intra-Class-Correlation 2, ADM = Mean Absolute Deviation Index, TL = Transformational Leadership.
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

	Dual effects model			Moderated dual effects model
	B (SE)	ß (SE)	ES (SE)	B (SE)
School-level (L2) effects				
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.)				.000 (.001)
group-focused TL x school size → collective efficacy				-.031 (.011)**
span of control → collective efficacy				-.007 (.002)**
Teacher-level (L1) effects				
ind-focused TL → ind. teacher efficacy	.085 (.022)**	.162 (.038)**	.326 (.083)**	.083 (.021)**

Notes. ** = p < .01; 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.