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Teachers' work motivation: Examining perceived leadership practices and salient outcomes

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ARTICLE INFO	A B S T R A C T
Keywords: Teacher motivation Self-determination theory Autonomy-support Turnover intentions Emotional well-being Big-5 personality factors	This study examined work motivation among 502 Australian teachers. Perceptions of autonomy-supportive and autonomy-thwarting leadership practices were examined as predictors of work motivation and, in turn, four outcomes (extra-role behavior, turnover intentions, positive affect, negative affect). A global factor of self-determined motivation and four specific factors (identified, introjected, external regulation, amotivation) were examined. Autonomy-supportive leadership was positively associated with global self-determined motivation and amotivation, whereas autonomy-thwarting leadership was positively associated with external regulation and amotivation. In turn, global self-determined motivation predicted all outcomes as expected. Two specific factors also predicted outcomes. Findings identify factors relevant for supporting positive teacher outcomes.

1. Introduction

Efforts to understand what factors are linked with greater engagement, retention, and well-being among teachers have intensified over the past decade (Hascher & Waber, 2021), largely driven by rising concerns about teacher burnout and attrition (e.g., Australian Government, 2022; UK Department for Education, 2018). One factor relevant to these issues is teacher motivation. Prior work has shown that motivation is important for positive teacher outcomes (Nie et al., 2015; Slemp et al., 2020), as well as for positive student and school outcomes (Daumiller et al., 2021; Lazarides et al., 2023). A common theoretical approach for examining motivation is self-determination theory (SDT; Ryan & Deci, 2017), which specifies qualitatively distinct types of motivation on a continuum from amotivation to intrinsic motivation. Research among teachers has shown that the SDT motivation types are differentially linked with a range of engagement, retention, and well-being outcomes (e.g., Collie et al., 2016; Nie et al., 2015; Wu et al., 2022). However, important gaps in knowledge remain. In particular, recent advancements in modelling now allow for more conceptually robust considerations of the SDT motivation types by capturing the continuum of self-determination that underlies the factors (Howard et al., 2020). More precisely, researchers are using bifactor approaches to model individuals' overarching (or global) motivation alongside the specific motivation components attributable to the distinct SDT motivation types (e.g., Bureau et al., 2023; Howard et al., 2020). This bifactor approach is informative for research and theory because it enables a more accurate

understanding of motivation as conceptualized by SDT, and for practice because it can yield knowledge about the particular motivation factors that should be targeted in efforts to better support teachers' outcomes. Notably though, this new approach has apparently not yet been used to examine teacher motivation. There is thus a need to apply this novel approach to provide a more rigorous understanding of the role of work motivation in teachers' workplace experiences. The aim of the present study, therefore, was to use a bifactor approach to examine the different types of SDT motivation among teachers (assessed near the beginning of a school term, Time 1) in relation to predictors (autonomy-supportive and autonomy-thwarting leadership; also assessed at Time 1) and outcomes assessed later in the term (Time 2 extra-role behavior, turnover intentions, positive affect, and negative affect). Fig. 1 displays the hypothesized model.

1.1. The motivation continuum within self-determination theory

SDT (Ryan & Deci, 2017; Ryan et al., 2022) is focused on human development, and a core aspect of the theory is its depiction of qualitatively different types of motivation that fall along a continuum of self-determination. The most self-determined form of motivation is *intrinsic motivation*, which involves undertaking a behavior due to inherent interest or joy. For teachers, this might involve putting effort into work because they gain satisfaction from doing so. *Identified regulation* involves being motivated to undertake a behavior because the consequence of such an action is valued and personally endorsed. For

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teachers, this may involve putting effort into work because they value seeing students develop their skills and knowledge. Together, intrinsic motivation and identified regulation are collectively termed autonomous motivation because they are characterized by high levels of volition and choice (Ryan & Deci, 2017).

Next are two types of regulation that are jointly called controlled motivation because they involve behavior regulation characterized by pressures that are perceived to be externally controlled (Ryan & Deci, 2017; Ryan et al., 2022). *Introjected regulation* involves being motivated to undertake a behavior to gain approval or avoid disapproval from oneself or others. For example, this might involve teachers putting effort into their work so they can avoid feeling like a bad teacher. *External regulation* involves being motivated to undertake a behavior due to external pressures, such as to avoid punishment or to receive a reward. For teachers, this might involve putting effort into work so that they avoid getting in trouble or so they are recognized for their hard work.

Finally, *amotivation* reflects a state of no motivation (e.g., disinterest, apathy). For teachers, this involves not putting any effort into work because, for example, it is viewed as being pointless or unsatisfying. Together, the five types of motivation reflect the SDT continuum of motivation. According to SDT (Ryan & Deci, 2017; Ryan et al., 2022), individuals' motivation within a context, such as a teacher within a school, is impacted by the extent to which the context is autonomy-supportive and/or autonomy-thwarting. In turn, individuals' motivation impacts their outcomes within that environment. In the following sections, the contextual predictors and outcomes examined in the present study are introduced.

1.2. Autonomy-supportive and -thwarting leadership practices

Leadership practices are implicated in the experiences that teachers have at work (Eyal & Roth, 2011; Klassen et al., 2012; Nie et al., 2015). In the present study, teachers' perceptions of two leadership practices were examined. Autonomy-supportive leadership fosters teachers' empowerment and self-initiative through participative practices that seek input and involvement from teachers, and attuning practices that involve efforts to understand the needs of each teacher (Aelterman et al., 2019; Ryan & Deci, 2017; see also Slemp et al., 2018). Autonomy-thwarting leadership involves controlling or pressuring teachers through demanding practices that insist or force compliance, and domineering practices that generate feelings of guilt or shame (Aelterman et al., 2019; Ryan & Deci, 2017). Whereas autonomy-supportive leadership promotes individuals' internalization and self-determination, autonomy-thwarting leadership does not (Ryan & Deci, 2017; Soenens et al., 2012).

Prior work has shown that teachers' perceptions of autonomysupportive leadership practices are associated with positive workrelated experiences (Ebersold et al., 2019; Ryan et al., 2022; Slemp et al., 2018), including motivation (Collie et al., 2016; Nie et al., 2015;

Wu et al., 2022). For example, Nie et al. (2015) demonstrated that autonomy-supportive leadership was associated with greater intrinsic motivation, identified regulation, introjected regulation, and lower external regulation and amotivation. Other researchers have demonstrated that autonomy-supportive leadership has a positive bivariate association with identified regulation (Collie et al., 2016) and autonomous motivation (Wu et al., 2022). Far fewer studies have examined autonomy-thwarting leadership, but those that have show this type of leadership is associated with negative outcomes, including greater basic psychological need frustration (Wu et al., 2022) and emotional exhaustion (Collie, 2021). In related work, Eyal and Roth (2011) examined transactional leadership, which involves monitoring others' actions to ensure compliance, and is thus similar to the demanding component of autonomy-thwarting leadership (Bass, 1995). Eyal and Roth found that perceptions of transactional leadership were associated with greater controlled motivation among teachers. Taken together, prior research shows that perceptions of autonomy-supportive and -thwarting leadership are salient for teachers' work motivation (and other outcomes). As will be explained in detail below, research is now needed to test whether similar associations occur when using bifactor approaches to model motivation.

1.3. Engagement, retention-related, and well-being outcomes

Teachers' contextual experiences at work and their motivation are linked with their workplace and broader life outcomes (Slemp et al., 2020; Tadić Vujčić et al., 2017). In the present study, four outcomes were examined. *Extra-role behavior* is an assessment of engagement at work, and refers to employees' voluntary and socially responsible behavior that goes beyond what is expected in their role (Somech & Drach-Zahavy, 2000). *Turnover intentions* reflect a retention-related outcome, and refer to teachers' plans to pursue other work and leave their existing job (Michaels & Spector, 1982). Finally, affect is an emotional well-being outcome. *Positive affect* reflects individuals' experiences of positive emotions (e.g., inspired, alert, determined), whereas *negative affect* reflects individuals' experiences of negative emotions (e.g., hostile, nervous, ashamed; Diener & Emmons, 1984).

The four outcomes were selected because they traverse well-recognized categories of behavioral (extra-role behavior), cognitive (turnover intentions), and emotional (positive and negative affect) aspects of psychosocial experiences (e.g., Fredricks et al., 2004). Moreover, the outcomes comprise key components of psychological functioning: functioning effectively (extra-role behavior, turnover intentions) and feeling good (affect; Huppert & So, 2013). Further, extra-role behavior and turnover intentions concern teachers' workplace experiences, whereas the two emotional well-being outcomes reflect teachers' experiences in life more broadly—thus capturing the major dimensions of teachers' lives. Together, then, the outcomes capture salient categories, components, and dimensions of teachers'





psychological functioning.

Prior research has shown that work motivation is relevant to teachers' experiences both at work and outside of work (Slemp et al., 2020; Tadić Vujčić et al., 2017). For example, autonomous motivation is associated with greater work engagement (Abós et al., 2018), work commitment (Fernet et al., 2016), and positive affect (Tadić Vujčić et a., 2017), whereas controlled motivation is linked with lower work engagement (Li et al., 2015). Looking at specific types of regulation, intrinsic motivation and identified regulation have been linked with greater job satisfaction (Collie et al., 2016; Nie et al., 2015), greater organizational commitment (Collie et al., 2016), and lower burnout (Eyal & Roth, 2011). Introjected regulation has been associated with greater job satisfaction in some studies (Nie et al., 2015), but not others (Collie et al., 2016). In contrast, external regulation has been associated with lower job satisfaction (Collie et al., 2016; Nie et al., 2015), and greater work stress, illness symptoms (Nie et al., 2015), and burnout (Eyal & Roth, 2011). Finally, amotivation has been associated with greater work stress and illness symptoms (Nie et al., 2015).

In summary, prior research indicates that the different types of motivation are relevant for a range of outcomes among teachers. Whereas intrinsic motivation and identified regulation are associated with positive outcomes, the reverse is true for external regulation and amotivation—and the findings involving introjected regulation are mixed. However, prior work does not appear to have examined extra-role behavior or turnover intentions—and it has typically used cross-sectional designs (Bardach & Klassen, 2021). Moreover, the prior research summarized above has not used recent approaches for model-ling SDT motivation, which are introduced next.

1.4. New approaches for examining work motivation

Although the SDT motivation types have been examined among teachers, existing research is based on earlier approaches for modelling SDT motivation. For example, one approach has examined the different types of motivation as separate variables (e.g., Collie et al., 2016)—however, this method is not able to capture the continuum of self-determination that is theorized to be underlying the factors (i.e., from high levels in intrinsic motivation to low levels in external regulation; Howard et al., 2020). Another approach has involved investigating higher-order factors of autonomous and controlled motivation—but this method cannot capture the full multidimensional nature of motivation given different factors are merged together (Howard et al., 2020).

Recently, researchers have recommended that the SDT motivation factors are optimally represented by examining a global factor of motivation, alongside specific factors representing the distinct motivation types (Bureau et al., 2023; Howard et al., 2020; Litalien et al., 2017). This method of examining global and specific factors is called a bifactor approach, and has the advantage of capturing the continuum inherent in SDT motivation, while also allowing the different types of motivation in SDT to be examined (Howard et al., 2020). Bifactor approaches also mean it is possible to disentangle the role of self-determination from the unique component of the different types of motivation (Howard et al., 2020).

Within the bifactor approach, global self-determined motivation represents overarching volition and choice (e.g., "I want to do this"; Lohbeck et al., 2022). In contrast, the specific factors reflect the unique aspects of each remaining type of motivation after extracting selfdetermination (e.g., the part of identified regulation that is not shared with the global factor; Howard et al., 2020). Emerging research among employees from a range of professions (e.g., Tóth-Király, Morin, Bőthe, Rigó, & Orosz, 2021) demonstrates evidence that bifactor approaches yield a more complete picture of employee functioning by separating global from specific aspects. However, it appears that the researchers have yet to use this approach to examine teacher motivation. This gap is important to address given that teachers' work is different from other professions (e.g., teachers spend most of their time with their "clients"; Klassen et al., 2012), and given that teacher motivation is linked with outcomes for students (Lazarides et al., 2023).

Notably, emerging work among students (Bureau et al., 2023) suggests that bifactor approaches where intrinsic motivation is used to define the global factor, but does not have its own specific factor, may be even more informative. This approach, called S-1 bifactor modelling, ensures the global factor represents self-determination because it is anchored in intrinsic motivation. Moreover, self-determination is inherent to intrinsic motivation and so allowing these aspects to be represented by one global factor is better aligned with SDT (Ryan & Deci, 2017)—rather than separating them into two distinct factors (a global motivation factor and a specific factor of intrinsic motivation as can occur with other bifactor approaches; see Methods for more details; Bureau et al., 2023). The present study thus applied an S-1 bifactor approach to test whether this is an effective approach for examining teacher motivation (Research Question [RQ] 1), and also examined predictors and outcomes of the global and specific motivation factors.

1.5. Predictors and outcomes of global and specific motivation factors

As summarized above, research has linked the SDT motivation types with autonomy-supportive and -thwarting leadership. However, this prior research is based on earlier approaches to modelling SDT motivation. Research using recent bifactor approaches is now needed to augment and advance knowledge-in particular, to ascertain whether the leadership practices are associated with global and/or specific factors. Such research is important for guiding the development and focus of leadership efforts and interventions, including how these may be linked with subsequent motivation. Based on SDT (Ryan & Deci, 2017), it was hypothesized that autonomy-supportive leadership would be associated with greater global self-determined motivation (Hypothesis 1a), whereas there would be no association between autonomy-thwarting leadership and the global factor (Hypothesis 1b). Because no research has examined predictors of the specific factors among teachers, no firm hypotheses were made about whether these associations would be significant beyond the role of the global factor and this was left as an open empirical question (RQ2).

Prior research has also linked the SDT motivation types with outcomes among teachers, but the use of earlier modelling approaches means questions remain about the associations (Howard et al., 2020). For example, identified regulation has been linked with greater job satisfaction (Collie et al., 2016)—however, it is not possible to tell if this is due to the self-determination underlying identified regulation or the unique aspects of the factor. Disentangling these components is relevant for informing whether intervention efforts should be targeted to self-determination broadly (i.e., via the global factor) or to the specific factors of motivation.

In the present study, it was hypothesized that global self-determined motivation would be linked with greater extra-role behavior, lower turnover intentions, greater positive affect, and lower negative affect (Hypotheses 2a-2d). This is because the global factor involves internally endorsing the value of one's work, and thus leads to behaviors and intentions in alignment with that (Ryan & Deci, 2017)—such as greater extra-role behavior and lower intentions to quit. Moreover, intrinsic motivation involves undertaking actions for enjoyment and pleasure and thus is linked with greater emotional well-being (Ryan & Frederick, 1997). With an S-1 bifactor approach, global self-determined motivation is anchored in intrinsic motivation (Bureau et al., 2023), and thus is expected to be linked with greater positive affect and lower negative affect.

For the specific factors, no firm hypotheses were established given prior research has not disentangled the continuum of SDT from the specific factors among teachers. Thus, the associations between the specific factors and the outcomes were left as an open research question (RQ3). Given some research has also demonstrated direct and indirect links between the leadership practices and similar outcomes (e.g., Ebersold et al., 2019), these associations were also tested (RQ4a-4b).

2. Study overview

This study involved examining teachers' perceptions of autonomysupportive and -thwarting leadership practices in relation to their work motivation and outcomes. Leadership practices and work motivation were both assessed near the start of the term (week three of a 10week term; Time 1). Work motivation was examined by specifying a global factor of self-determined work motivation and four specific factors of identified regulation, introjected regulation, external regulation, and amotivation. Four outcomes were assessed later in the same school term (week seven; Time 2): extra-role behavior, turnover intentions, positive affect, and negative affect. This timeframe of one school term is important to examine because teaching work is partitioned into clearly demarcated terms (separated by short vacations) that largely determine the scope and sequence for learning and teaching. Moreover, teachers' outcomes tend to worsen as the term progresses (Kühnel & Sonnentag, 2011). This timeframe is also salient for ascertaining whether there are factors at the beginning of a term that are linked with more positive outcomes later in the term—which can then inform practice about what initial factors should be addressed to help teachers begin each school term from a strong position.

Analyses involved first confirming the specification of work motivation using an S-1 bifactor exploratory structural equation modelling. Following this, the leadership practices were examined as predictors of the work motivation factors, and all factors were examined as predictors of the outcomes. Indirect associations were tested to ascertain the extent to which the leadership practices were associated with the outcomes via the motivation factors. Teacher background characteristics (gender, teaching experience, and school level) and personality factors (openness, extraversion, agreeableness, conscientiousness, and emotional instability) served as covariate controls for all factors (see Methods). Fig. 1 displays the hypothesized model.

3. Method

3.1. Sample and Procedures

The sample comprised 502 teachers working in primary schools (58%), secondary schools (37%), or at both levels (5%) in all states and territories of Australia. Participants identified as female (87%), male (13%), or used a different term to describe their gender (<1%). These gender statistics are similar to the teaching population in Australia (primary schools are 82% female, secondary schools are 61% female; Australian Bureau of Statistics [ABS], 2022). On average, teachers were 34 (SD = 9) years old and had 10 (SD = 8) years of teaching experience. Of the sample, most held a bachelor's degree (63%) or a postgraduate degree (36%; the remainder held a certificate or diploma; 1%), and most (92%) spoke only English at home. Teachers worked in government (72%), systemic Catholic (14%), or non-government/independent schools (14%), which aligns with the breakdown by sector for the Australian teaching population: 63% in government, 19% in systemic Catholic, and 17% in independent schools (ABS, 2022). Teachers reported their school's location as inner city (10%), suburban (74%), rural (16%), or remote (<1%), and their school's socio-economic status as low (17%), below average (17%), average (42%), above average (20%), or high (5%).

Data were collected between May and June 2022, which was Term 2 (out of four terms) in the Australian school year. Participants completed two online surveys in the 10-week term: Time 1 was in week three of the term and the Time 2 was in week seven of the same term. This timeframe was during the COVID-19 pandemic. For most of the sample, their teaching was not impacted by COVID-19 restrictions (teaching as usual; 95%), with a small minority of teachers hybrid teaching (4%) or remote

teaching (<1%).

Participant recruitment was managed via Qualtrics and their market research panel partners. The study invitation was shared via email or app notification to individuals who had previously expressed interest in participating in school-focused research. Respondents opened the Time 1 online survey, provided consent, and answered screening questions checking that they were teachers employed in an Australian school. Teachers who passed the screening and completed the survey, but who did so hastily (<1/3 median time), answered the same across most of the survey (>80%), or responded alike to two oppositely worded item pairs¹ were excluded from the final sample (Dewitt et al., 2019). The response rate was 94% at Time 1. For the Time 2 survey, the Time 1 sample was reinvited to participate. Teachers were assigned a random ID at Time 1, which enabled matching with Time 2 responses. The sample size at Time 2 was 366, representing an attrition rate of 27% between the waves. Time 1 substantive factors were compared by attrition status using t-tests, and all were non-significant. Three background characteristics were associated with missingness at Time 2 (teacher age, educational qualification, and school SES). When these additional covariates were entered into the final model (described below), all significant paths remained—thus, only the original research-supported covariates were retained (Enders, 2022). The study received Institutional Review Board ethics approval.

3.2. Measures

Unless otherwise stated, teachers responded to all items on a scale from 1 (Strongly disagree) to 7 (Strongly agree).

3.2.1. Leadership practices

Leadership practices were assessed at Time 1 with the Leadership Approach to Autonomy Scale (Collie, 2021). Five items assessed autonomy-supportive leadership practices (e.g., "My principal listens to my perspective") and five items assessed autonomy-thwarting leadership practices (e.g., "My principal expresses disappointment if I don't do things their way"). Prior research has provided evidence of measurement invariance, expected correlations, and adequate reliability for the scale scores (Collie, 2021). In the current study, reliability was calcuusing McDonald's omega and was adequate for lated autonomy-supportive leadership practices (ω .89) and = autonomy-thwarting leadership practices ($\omega = 0.93$).

3.2.2. Motivation

Motivation was assessed at Time 1 with the Multidimensional Teacher Motivation Scale (Collie, 2022). Participants responded to the stem, "Why do you put effort into your current job?" Four items each assessed *intrinsic motivation* (e.g., "Because I really enjoy doing my work"), *identified regulation* (e.g., "Because I personally value putting effort into this job"), *introjected regulation* (e.g., "Because I want my supervisors to think I'm an effective worker"), *external regulation* (e.g., "Because otherwise I risk losing my job"), and *amotivation* (e.g., "I put in little effort because I don't see the point of doing more"). Reliability (calculated from the S-1 bifactor exploratory structural equation model; see details below) was adequate (see Table 1 and Results sections for additional details). Further evidence of validity is presented below and in Supplementary Materials.

¹ The two pairs appeared early in the survey and comprised the items used to assess intrinsic motivation ("Because I really enjoy doing my work") vs. amotivation ("Honestly, I don't put much effort into my current job because it is pointless") and identified regulation ("Because I personally value putting effort into this job") vs. external regulation ("Because otherwise I risk losing my job"). Because the item pairs refer to opposing motives, teachers who responded (strongly) agree for both items or (strongly) disagree for both items were exited from the survey.

Table 1

Reliability estimates and descriptive statistics.

	ω	М	SD
T1 Personality factors			
Openness	0.67	3.47	0.79
Extraversion	0.79	3.02	0.90
Agreeableness	0.67	4.02	0.72
Conscientiousness	0.68	3.72	0.82
Emotional instability	0.69	3.11	0.82
T1 Leadership practices			
Autonomy-support	0.89	4.47	1.23
Autonomy-thwarting	0.93	3.38	1.53
T1 Motivation			
Global self-determined motivation (g)	0.92	a	a
Identified regulation (s)	0.66	5.95	0.79
Introjected regulation (s)	0.65	5.07	1.01
External regulation (s)	0.79	4.16	1.15
Amotivation (s)	0.76	2.12	1.20
T2 Outcomes			
Extra-role behavior	0.82	4.99	1.08
Turnover intentions	0.89	3.52	1.71
Positive affect	0.82	2.30	0.69
Negative affect	0.79	3.23	0.61

Note. Gender was coded male (0) and female (1). School level was coded primary school (0) and secondary or both primary and secondary school (1).

^a The mean for intrinsic motivation was 5.24 (SD = 1.05). (g) = global factor. (s) = specific factor.

3.2.3. Outcomes

Outcomes were assessed at Time 2. Extra-role behavior was assessed with four items (e.g., "At work, I volunteer for roles and tasks that I am not required to do; "Collie, Guay, Martin, Caldecott-Davis, & Granziera, 2020). *Turnover intentions* were assessed with Michaels and Spector's (1982) three items (e.g., "I intend to quit my current job"). Positive and negative affect were assessed using Thompson's (2007) International Positive and Negative Affect Schedule Short Form. Teachers were asked to consider how they generally feel in relation to five position emotions (determined, attentive, alert, inspired, active) and five negative emotions (afraid, nervous, upset, ashamed, hostile). Teachers responded on a scale from 1 (Never) to 5 (Always). Evidence of validity for the four outcomes has been demonstrated in prior research (e.g., Meyer et al., 2019; Thompson, 2007) and in the present study (see below). Reliability was adequate for extra-role behavior ($\omega = 0.82$), turnover intentions ($\omega = 0.79$).

3.2.4. Background characteristics and personality factors

Three teacher/school characteristics (gender, teaching experience, school level) and the Big Five personality factors (Norman, 1963) assessed at Time 1 were included in the study as covariates. These variables have been linked with the substantive variables in prior research. For example, female and more experienced teachers have been shown to report lower well-being (Collie, 2021). Moreover, the personality factors are associated with a range of constructs among teachers, such as autonomy-supportive leadership (Collie, 2021) and well-being (Kokkinos, 2007).

Gender was scored 0 for male teachers and 1 for female teachers. Teaching experience was a continuous variable scored in years. School level was scored as 1 (working in a primary school) or 2 (working in a secondary school, or both primary and secondary school). The Big Five personality factors were assessed using Donnellan et al.'s (2006) 20-item Mini-IPIP (International Personality Item Pool) scale: openness (e.g., "I have a vivid imagination"), agreeableness ("I sympathize with others' feelings"), conscientiousness (e.g., "I get chores done right away"), extraversion (e.g., "I talk to a lot of different people at parties"), and neuroticism (e.g., "I get upset easily"). Prior research has yielded evidence of validity of the scale scores, including expected associations with other personality scales (Donnellan et al., 2006).

3.3. Data analysis

Using Mplus 8.7 (Muthén & Muthén, 2022), analyses comprised confirmatory factor analysis (CFA), (bifactor) exploratory structural equation modelling (ESEM), and structural equation modelling (SEM). In all analyses, robust maximum likelihood was used as the estimator, along with full information maximum likelihood (FIML) to handle within-timepoint missing data (<1%; see Sample and Procedure for between-timepoint missing data approaches). Model fit was assessed using the root-mean-square error of approximation (RMSEA), the comparative fit index (CFI), and the Tucker Lewis Index (TLI). RMSEA values ≤ 0.08 and CFI/TLI values ≥ 0.90 imply adequate fit (Hu & Bentler, 1999).

3.3.1. Preliminary analyses

Means and standard deviations were calculated for each variable. Following this, the model specification for the motivation factors was tested. An S-1 bifactor ESEM specification was expected to be optimal. As explained earlier, bifactor models estimate a global factor capturing shared variance across factors, along with several specific factors capturing variance unique to each subfactor. Typically, researchers have used a symmetrical bifactor approach to examine SDT motivation factors, wherein all items are loaded onto the global factor and simultaneously loaded onto specific factors representing each subscale (with cross-loadings for non-target items specified to be close to zero for the specific factors and orthogonal rotation). However, with SDT motivation this symmetrical approach means that the nature of the global factor changes across studies depending on whether researchers include or exclude amotivation, and also depending on what scale is used to assess motivation (given some scales assess different components of the SDT motivation continuum; Bureau et al., 2023).

By comparison, S-1 bifactor ESEM ensures that the global factor represents self-determined motivation because it is anchored in intrinsic motivation. More precisely, this approach involves loading all items onto the global factor (as per symmetrical bifactor ESEM), and by simultaneously loading all items onto four specific factors of identified regulation, introjected regulation, external regulation, and amotivation. A specific factor for intrinsic motivation is not included in S-1 bifactor modelling, thus allowing the global factor to be grounded in these items. This means that the global factor in the S-1 bifactor ESEM approach is easier to interpret and more consistent across studies (Bureau et al., 2023). As per symmetrical bifactor ESEM, cross-loadings for non-target items are specified to be close to zero for the specific factors in the S-1 bifactor approach and orthogonal rotation is used. Thus, the major differences between the two bifactor approaches are that in S-1 bifactor modelling there is one less specific factor and the global factor is anchored in self-determined motivation.

To confirm S-1 bifactor ESEM was the most appropriate specification for the motivation factors, CFA, ESEM, and symmetrical bifactor ESEM solutions were first run. Each solution was compared in terms of model fit, factor loadings (e.g., to check there was a well-defined global factor and relatively well-defined specific factors), and cross-loadings (Morin et al., 2020). In addition, given the S-1 bifactor ESEM is nested within the symmetrical bifactor ESEM, it is expected the symmetrical model will have better fit. Thus, changes in RMSEA of \leq 0.015 and changes in CFI/TLI of \leq -0.01 (Chen, 2007; Cheung & Rensvold, 2002) between the symmetrical and S-1 bifactor models were calculated to ensure the nested model did not yield significantly poorer fit. Full details of all models are presented in Supplementary Materials.

Assuming the S-1 bifactor ESEM provided the optimal solution, this was then used to calculate reliability estimates using McDonald's omega (using absolute values and while ignoring cross-loadings for specific factors; Morin et al., 2020). With (bifactor) ESEM, lower reliability coefficients for specific factors are expected because items contribute to more than one factor (Morin et al., 2020). Omega estimates of ≥ 0.50 were considered adequate for specific factors, and estimates of ≥ 0.70

were considered adequate for the global factor (Morin et al., 2020).

For the predictors and outcomes, separate CFAs were used to ascertain factor structure, calculate omega coefficients, and save factor scores for use in the main analyses. Factor scores were used because the complexity of bifactor ESEM means it is difficult to integrate latent predictors and outcomes. Measurement invariance tests were also run for each of the predictor, motivation, and outcome models to ascertain whether the items functioned similarly across two key subgroups in the sample (i.e., by teaching experience and school level—not gender because the sample size for male teachers was not large enough; see Supplementary Materials for details).

3.3.2. Main analyses

A measurement model was run with the optimal solution for motivation (presumed to be the S-1 bifactor ESEM specification), along with the factor scores for the predictors and outcomes, and the covariates. The background characteristics were modelled with loading set to 1 and residual set to 0. The personality factors were modelled as error-adjusted mean scores, with loading constrained to 1 and residual set using $\sigma^2 * (1-\omega)$, where σ^2 is the variance and ω is the reliability of the factor (Brown, 2006). Reliability was calculated through a preliminary CFA involving the personality items (χ^2 [156] = 385.18, p < .001, RMSEA = 0.054, CFI/TLI = 0.90). In line with prior research (Collie, 2023; Laverdière et al., 2013), four residual variances were covaried in that preliminary CFA.

The measurement model yielded correlations among all factors. Next, SEM was run with the final specification from the measurement model and the structural paths shown in Fig. 1. All factors were adjusted for the covariates. Factors at the same point in the model were correlated to control for shared variance (except in the case of the motivation factors, given bifactor ESEM is orthogonal). Finally, indirect associations from the predictors to the outcomes (via motivation) were examined. Because bootstrapping is not currently available in *Mplus* with ESEM, indirect associations were tested without bootstrapping in the main SEM, as well as using a non-parametric bootstrapping approach (1000 draws; Shrout & Bolger, 2002) in a path analysis that employed factor scores saved from the S-1 bifactor ESEM motivation model (along with the other factor scores). Indirect associations that were significant in both approaches are reported below.

4. Results

4.1. Preliminary analyses

Means and standard deviations are shown in Table 1. As expected, the S-1 bifactor ESEM was confirmed as the optimal specification for motivation over the symmetrical bifactor ESEM (and preliminary CFA and ESEM specifications). More precisely, the S-1 bifactor ESEM yielded good fit: γ^2 (100) = 221.55, p < .001, RMSEA = 0.049, CFI = 0.97, and TLI = 0.94. The S-1 bifactor ESEM had a well-defined global factor ($|\lambda|$ = 0.03-0.82; M = 0.48), and relatively well-defined specific factors ($|\lambda|$ = 0.28-0.84; M = 0.52)—which support the appropriateness of the solution (Morin et al., 2020). In addition, the S-1 bifactor ESEM had small cross-loadings ($|\lambda| = 0.00-0.36$, M = 0.09)—again, indicating its appropriateness (Morin et al., 2020). Changes in fit between the S-1 bifactor ESEM and the symmetrical bifactor ESEM (χ^2 [85] = 171.77, p < .001, RMSEA = 0.045, CFI = 0.98, TLI = 0.95) were within cut-offs indicating no deterioration of model fit between the two-and thus the S-1 bifactor ESEM was retained. For full details of the model specification tests, see Supplementary Materials.

The final S-1 bifactor ESEM comprises a global factor (global selfdetermined motivation) and four specific factors representing identified regulation, introjected regulation, external regulation, and amotivation. Supplementary Materials show the loadings for the S-1 bifactor ESEM solution and the results of measurement invariance tests across teaching experience and school level, which demonstrated equivalence in intercepts and loadings. For the global factor, intrinsic motivation items loaded most robustly (strong positive loadings on average), followed by identified regulation items (moderate positive loadings), introjected regulation items (weak positive loadings), external regulation items (small negative loadings), and then amotivation items (moderate negative loadings). This reflects the self-determination continuum, which is strongest with intrinsic motivation and weakest with amotivation. Omega coefficients were calculated from the final motivation model (see Table 1). Reliability was adequate for the global factor ($\omega = 0.92$) and the specific factors (where $\omega \ge 0.50$ is considered adequate; Morin et al., 2020): identified regulation ($\omega = 0.66$), introjected regulation ($\omega = 0.65$), external regulation ($\omega = 0.79$), and amotivation ($\omega = 0.76$).

The CFAs involving the predictors (χ^2 [34] = 62.86, p = .002, RMSEA = 0.041, CFI = 0.99, TLI = 0.98) and outcomes (χ^2 [113] = 252.24, p < .001, RMSEA = 0.058, CFI = 0.93, TLI = 0.92) both yielded adequate fit. Omega estimates were calculated from these models and were adequate (see Table 1). Supplementary Materials provide details of measurement invariance tests by teaching experience and school level for the predictors and outcomes, and again these demonstrated equivalence.

4.2. Main analyses

The measurement model comprising the predictor factor scores, latent motivation global and specific factors, the outcome factor scores, the background characteristics, and the error-adjusted mean scores for the personality factors yielded adequate fit: χ^2 (310) = 554.46, p < .001, RMSEA = 0.040, CFI = 0.96, TLI = 0.93. Correlations among substantive factors are presented in Table 2 and were generally as expected. For correlations involving covariates and a full description of all correlations, see Supplementary Materials.

The SEM also yielded adequate fit: χ^2 (310) = 554.50, p < .001, RMSEA = 0.040, CFI = 0.96, TLI = 0.93. Fig. 2 displays the results and Table 3 presents the standardized beta estimates and R^2 estimates. Associations among substantive factors are described here (for a description of results involving covariates, see Supplementary Materials). Autonomy-supportive leadership was associated with greater global self-determined motivation (global factor) and greater amotivation (specific factor). Autonomy-thwarting leadership was positively associated with two specific factors: external regulation and amotivation. In turn, global self-determined motivation was associated with all outcomes: greater extra-role behavior and positive affect, and lower turnover intentions and negative affect. Of the specific factors, identified regulation was associated with greater turnover intentions, and introjected regulation was associated with greater extra-role behavior. Indirect associations revealed four significant paths that were from autonomy-supportive leadership via the global factor to each outcome: extra-role behavior ($\beta = .14$, SE = 0.03, p < .001, 95% CI[0.08, 0.20]), turnover intentions ($\beta = -0.18$, SE = 0.04, p < .001, 95% CI[-0.25, -0.11]), positive affect ($\beta = 0.17$, SE = 0.04, p < .001, 95% CI[0.10, 0.24]), and negative affect ($\beta = -0.08$, SE = 0.03, p = .002, 95% CI [-0.13, -0.03]).

5. Discussion

This study examined teachers' perceptions of autonomy-supportive and -thwarting leadership practices in relation to global and specific factors of work motivation. In turn, all factors were examined in relation to teachers' outcomes assessed later in the same school term. Findings demonstrated that autonomy-supportive leadership was positively associated with global self-determined motivation (global factor) and amotivation (specific factor), whereas autonomy-thwarting leadership was positively associated with external regulation (specific factor) and amotivation (specific factor). In turn, global self-determined motivation was linked with all four outcomes: greater extra-role behavior, lower Correlations among substantive factors.

-										
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
T1 Leadership practices										
1. Autonomy-support										
2. Autonomy-thwarting	-0.73*									
T1 Motivation										
3. Global self-determined motivation (g)	0.47*	-0.42*								
4. Identified regulation (s)	-0.07	0.07	-							
5. Introjected regulation (s)	0.09	-0.01	-	-						
6. External regulation (s)	-0.07	0.20*	-	-	-					
7. Amotivation (s)	0.08	0.06	-	_	-	-				
T2 Outcomes										
8. Extra-role behavior	0.29*	-0.19*	0.50*	0.02	0.22*	-0.11	0.01			
9. Turnover intentions	-0.43*	0.40*	-0.59*	0.27*	0.03	0.01	0.10	-0.34*		
10. Positive affect	0.25*	-0.21*	0.55*	0.01	-0.01	-0.04	-0.04	0.44*	-0.42*	
11. Negative affect	-0.29*	0.30*	-0.36*	0.07	0.21	0.06	-0.03	-0.20	0.44*	-0.45*

Note. (g) = global factor. <math>(s) = specific factor.

**p* < .05.



Fig. 2. Standardized Beta Estimates from Structural Equation Modelling Note. T1 = Time 1. T2 = Time 2. (g) = global factor. (s) = specific factor.

turnover intentions, greater positive affect, and lower negative affect. Beyond the role of the global factor, identified regulation (specific factor) was linked with greater turnover intentions, and introjected regulation (specific factor) was linked with greater extra-role behavior. Notable findings are discussed.

5.1. S-1 bifactor ESEM specification

Recent advances in modeling allow researchers to better capture the continuum of motivation inherent to SDT, as well as the specific aspects of the separate motivation types (Bureau et al., 2023; Howard et al., 2020; Tóth-Király et al., 2021). Using those methods, this is one of the first studies to examine SDT motivation among teachers. Results indicated that this approach for modelling the motivation factors was optimal when compared with non-bifactor and symmetrical bifactor approaches. Findings of the S-1 bifactor ESEM (RQ1) demonstrated that loadings were as expected on the global factor—ranging from (on average) strongly positive for intrinsic motivation items to moderately

negative for amotivation items. Moreover, loadings for target items were appropriate and reliability was adequate for the specific factors (Morin et al., 2020)—indicating that these represent distinct aspects of motivation.

These results corroborate and extend research conducted among students (Bureau et al., 2023) to show the value among teachers of examining a global factor of self-determined motivation and four specific factors: identified regulation, introjected regulation, external regulation, and amotivation. Notably, an S-1 bifactor approach ensures that intrinsic motivation is not inadvertently separated from the underlying driver of self-determination that underlies all SDT motivation types (Bureau et al., 2023). More precisely, global self-determined motivation captures overarching self-determined work motivation among teachers—and reflects the idea of a continuum of motivation because it brings together this motive from all motivation types (Howard et al., 2020). Alongside this, the four specific factors reflect the unique aspects of each type of motivation—and thus capture the idea of there being qualitatively different types of SDT motivation (Howard et al.,

Table 3

Standardized beta estimates from structural equation modelling.

	T1 Leadership practices		T1 Motivation					T2 Outcomes			
	Aut supp.	Aut thwart.	Global self- deter.	Ident.	Introj.	Exter.	Amot.	Extra-role behavior	Turnover intentions	Positive affect	Negative affect
T1 Covariates											
Gender	0.01	0.03	0.05	-0.03	0.01	-0.03	0.06	0.08	0.03	0.05	-0.02
Teaching exp.	-0.12*	0.12*	0.01	0.14	-0.15*	-0.07	0.01	0.12*	-0.07	0.02	-0.04
School level	-0.17*	0.04	-0.10*	0.10	0.04	-0.05	-0.10	0.01	0.01	-0.04	0.07
Openness	-0.01	0.02	0.03	-0.05	-0.10	-0.10	0.01	0.04	-0.01	-0.01	0.02
Extraversion	0.11	-0.01	-0.10	-0.15	-0.02	-0.10	0.11	0.12	0.04	0.04	-0.01
Agreeable.	0.02	-0.10	0.34*	0.48*	0.06	0.10	-0.36*	0.05	-0.02	0.02	0.18
Conscient.	0.06	-0.03	0.02	0.04	0.11	-0.05	0.05	-0.06	-0.10	0.10	-0.11
Emo. instability	-0.06	0.15*	-0.22*	0.04	0.35*	-0.06	-0.07	-0.15	-0.01	-0.10	0.35*
T1 Leadership practice	S										
Autsupp.			0.35*	0.06	0.15	0.15	0.20*	0.14	-0.16*	0.05	-0.14
Aut-thwart.			-0.10	0.06	0.07	0.35*	0.24*	0.14	0.06	0.07	0.05
T1 Motivation											
Global self-deter								0.41*	-0.52*	0.48*	-0.23*
(g)											
Ident. (s)								0.01	0.28*	0.01	0.01
Introj. (s)								0.29*	0.01	0.03	0.08
Exter. (s)								-0.12	-0.02	-0.05	0.05
Amot. (s)								-0.01	0.13	-0.06	0.05
R-squared	7%	5%	39%	21%	19%	9%	15%	38%	48%	33%	36%

Note. Gender was coded male (0) and female (1). School level was coded primary school (0) and secondary or both primary and secondary school (1). Teaching exp. = teaching experience. Agreeable. = agreeableness. Conscient. = conscientiousness. Emo. instability = emotional instability. Aut.-Supp. = autonomy-supportive leadership practices. Aut.-Thwart. = autonomy-thwarting leadership practices. Global self-deter. = global self-determined motivation. Ident. = identified regulation. Introj. = introjected regulation. Exter. = external regulation. Amot. = amotivation. (g) = global factor. (s) = specific factor. *p < .05.

2020). The specific factor of identified regulation can be interpreted as involving motivation to undertake a behavior because the consequence is personality important, but not self-determined (i.e., lacking the active component of "I want to do this"; Bureau et al., 2023; Lohbeck et al., 2022). Introjected regulation (specific factor) can be interpreted as being motivated to gain approval or avoid disapproval, but again excludes the self-determined aspect of "I want to do this" (Lohbeck et al., 2022). External regulation (specific factor) is interpreted as being motivated to gain awards or avoid punishment (Bureau et al., 2023; Lohbeck et al., 2022). This motivation type inherently contains limited self-determination (Ryan & Deci, 2017) and thus does not change much after the global factor is extracted—as also evidenced by the low factor loadings on the global factor in the S-1 bifactor ESEM. Finally amotivation (specific factor) can be interpreted as being unmotivated due to indifference, and excludes the self-determined aspect of active disinterest (Bureau et al., 2023).

5.2. The role of autonomy-supportive and -thwarting leadership

Teachers' perceptions of autonomy-supportive leadership were linked with greater global self-determined motivation (beyond the role of background characteristics and personality factors). This finding was as hypothesized (Hypothesis 1a) and aligns with SDT likely because the global factor was anchored in intrinsic motivation, which is the most self-determined form of motivation (Ryan & Deci, 2017). Principals who seek input from and endeavor to understand teachers' perspectives help teachers to internalize the value of their work—which promotes self-determined motivation at work (Ryan & Deci, 2017). Boosting autonomy-supportive leadership practices may be one avenue for helping to support teachers' global self-determined motivation (discussed below).

As expected, autonomy-thwarting leadership was not consistently associated with the global factor, which aligns with Hypothesis 1b and SDT (Ryan & Deci, 2017). Associations between the leadership practices and the specific factors were left as an open research question (RQ2), and findings demonstrated that both autonomy-supportive and -thwarting practices were positively associated with the specific factor of amotivation. The association from autonomy-thwarting leadership makes sense. When principals are controlling, this can make teachers feel more pressured at work, which can result in amotivation as a means to avert those feelings of pressure (Ryan & Deci, 2017; Ryan et al., 2022).

The link between autonomy-supportive leadership and amotivation is counterintuitive. Perhaps this finding occurred due to the fact that data were collected after the acute phase of the COVID-19 pandemic. Research into natural disasters suggests there is a period of disillusionment after the acute phase of a disaster (Malinen et al., 2019). It is possible that the teachers in the current study were feeling more disillusioned or indifferent towards work. As a result, principals' efforts to be autonomy-supportive may have been viewed less positively-pushing teachers to be more amotivated. Alternatively, this association may be related to the personality factor of agreeableness, which was negatively associated with amotivation. More precisely, once the shared variance between agreeableness and autonomy-supportive leadership was controlled for in the SEM, the remaining variance in autonomy-support may have partially tapped into a more cynical view of leadership given the pandemic context. More research is needed to explore this finding, including using mixture modelling or qualitative approaches to better understand the experiences of different types of teachers. Results also demonstrated that autonomy-thwarting leadership was positively associated with the specific factor of external motivation. This finding is consistent with SDT, wherein pressuring leadership practices encourage individuals within that context to be motivated by external factors (e.g., rewards or punishments; Ryan & Deci, 2017).

Alongside those links, perceived autonomy-supportive leadership also directly predicted lower turnover intentions later in the school term (RQ4a). Thus, teachers who felt their principals were more attuned and responsive to their needs near the start of the school term were less likely to want to quit their jobs several weeks later. This finding possibly occurred because autonomy-supportive leadership means that teachers feel listened to and valued (Collie et al., 2020; Ryan et al., 2022), which engenders positive associations with work and thus less desire to leave. Finally, autonomy-supportive leadership was indirectly associated with all outcomes via the global motivation factor (RQ4b). This suggests that autonomy-supportive leadership is an avenue for practical efforts that may be relevant for supporting both motivation and the outcomes.

5.3. Motivation predicts teachers' outcomes

Global self-determined motivation was linked with all outcomes assessed later in the school term-beyond the role of background characteristics and personality factors (supporting Hypotheses 2a-2d). These findings provide important insight as they are the first evidence of the link between global self-determined motivation and teachers' outcomes. Global self-determined motivation is inherently imbued with internal endorsement of the value of one's job, which then promotes behaviors and intentions in alignment with that (Ryan & Deci, 2017; Ryan et al., 2022)-such as greater extra-role behavior and lower intentions to quit. Moreover, global self-determined motivation in the present study was anchored in intrinsic motivation, which involves undertaking actions for enjoyment and pleasure, and thus is understandably associated with greater positive affect and lower negative affect (Ryan & Frederick, 1997). These findings are important as they indicate that efforts to enhance teachers' global self-determined motivation may be a worthy point of intervention to boost subsequent outcomes.

Two specific factors were also associated with the outcomes beyond the role of the global factor (RQ3)—indicating the yields of considering specific factors that exclude self-determined motivation (Tóth-Király et al., 2021). Identified regulation was associated with greater turnover intentions later in the school term. This finding is somewhat surprising. As explained earlier, prior research has linked identified regulation with a range of positive outcomes; however, those studies (e.g., Collie et al., 2016) used methods that did not separate global self-determination from specific factors. As such, it was not possible to determine whether it was underlying self-determination or the unique aspect of identified regulation that was salient for the outcomes. The present findings suggest that it may have been the underlying self-determination that led to those associations with positive outcomes (e.g., Collie et al., 2016) given similar associations were not replicated here—though additional research is needed to confirm this.

The association between identified regulation and higher turnover intentions may have occurred because this specific factor reflects being motivated because something is personally important, but excludes selfdetermination (e.g., "I want to do this; " Bureau et al., 2023). Thus, teachers may be more likely to want to quit their job because they do not experience the volition that comes with self-determined motivation, despite finding their work important. This finding aligns with research among general employees showing the specific factor of identified regulation was associated with negative outcomes (e.g., lower perceived autonomy; Howard et al., 2018), and suggest that efforts to address self-determination may be most appropriate (discussed below). It is also worth noting that turnover intentions are not always a negative outcome. In some cases, quitting is the right decision (e.g., in cases of inadequate job or career fit), and this type of decision may also be implicated in the result. Future research is now needed to see whether identified regulation (specific factor) plays a different role in relation to other outcomes.

The specific factor of introjected regulation was positively associated with extra-role behavior. It is understandable that teachers who want to gain approval are more likely to engage in behaviors that lead to this—such as by going above and beyond to help colleagues via extrarole behavior. Both global self-determined motivation and introjected regulation (specific factor) predicted greater extra-role behavior—but based on very different motives. In future research, it will be important to test whether introjected regulation as a specific-factor is linked with poorer outcomes over a longer timeframe (e.g., emotional exhaustion) given it is not driven by self-determination. The final two specific factors of external regulation and amotivation were not associated with any outcomes. Additional research is now needed to further develop the nomological network of variables related to the global and specific factors. Moreover, recent research has highlighted teaching behaviors that are need-supportive for students (Aelterman et al., 2019; Ahmadi et al., 2023; Burgueño et al., 2023). Future studies might consider how teacher motivation as modelled via a bifactor approach (and outcomes) are linked with the application (or not) of more adaptive teaching behaviors (see, for example, Escriva-Boulley et al., 2021; Moè et al., 2022).

5.4. Implications for practice

Findings of the current study provide implications for practice that are informed by the S-1 bifactor modelling approach. Findings suggest that autonomy-supportive leadership practices may be a valuable focus for boosting global self-determined motivation (and outcomes). School leaders can apply autonomy-supportive practices by inviting teachers' input in decision-making and school policies, listening carefully to teachers' perspectives, and providing rationales when tasks are assigned to teachers (Ware & Kitsantas, 2011). At the same time, the findings suggest that principals may also want to reduce autonomy-thwarting practices, such as avoiding methods to motivate teachers that incite guilt or shame, or being too inflexible or commanding about how tasks are done (Aelterman et al., 2019; Soenens et al., 2012).

The S-1 bifactor design also revealed additional implications related to the outcomes. Specifically, efforts to build teachers' global selfdetermined motivation appear central. This can be achieved via autonomy-supportive practices (as detailed above), but also directly by ensuring teachers feel a sense of autonomy satisfaction (e.g., by making sure teachers have opportunities for autonomy within the curriculum; Collie et al., 2016; Ryan & Deci, 2017). Findings also suggest that efforts to directly boost identified regulation may be risky-unless these come with a focus on self-determination. For example, strategies may need to focus on teachers' personal valuing of the consequences of their efforts (e.g., because they want their students to succeed) as this incorporates self-determination, rather than on the general importance of teaching work (e.g., teaching is important for society). Efforts to directly boost introjected regulation (e.g., via messages of guilt, pride) may also be problematic. Although this specific factor was linked with greater extra-role behavior, its links with other outcomes remain unknown. Moreover, the global factor was more strongly associated with extra-role behavior, highlighting that efforts directly targeting that may be most appropriate.

5.5. Limitations

Several limitations should be considered when interpreting the results. First, the leadership practices were based on teachers' perceptions. Perceived leadership practices are different from actual or observed efforts by principals, but are important because it is teachers' interpretations that impact their experiences at work. Efforts to collect other reports (e.g., from principals or observers) will be helpful in future research to extend knowledge. Second, the leadership practices and motivation factors were collected at the same timepoint. Despite this, the hypothesized model was derived from theory and the outcomes were assessed at a later stage. Going forward, research that examines a longer gap between waves is important, as is research that collects more than two timepoints to ascertain changes over time.

Third, it was not possible to take into account nesting of teachers within the schools at which they worked due to the recruitment methods. This was unlikely to be a concern here because the sample was from across the country, but it is an important consideration for future research. Relatedly, multilevel modeling will allow for tests of schoolaverage perceived autonomy-support and how this is associated with teacher motivation and outcomes. Such analyses will yield understanding of staff agreement of perceived leadership practices, which is also helpful for triangulating individual perceptions. Fourth, although generally aligned with the gender breakdown of the teaching population in Australia (ABS, 2022), the sample was primarily female. Research that collects data from a greater percentage of male teachers is important. Finally, because respondents were immediately exited from the survey if they were flagged for responding incongruously (see Footnote 1), it is not possible to ascertain whether their exclusion would have impacted results. Future research that retains these respondents will allow for such tests. These limitations notwithstanding, the study's findings contribute to knowledge given key strengths of the design and analytic approach, including robust theoretical grounding, data collection across two timepoints, and the inclusion of controls for background characteristics and personality.

6. Conclusion

This study applied S-1 bifactor ESEM modelling to conduct an investigation of the SDT motivation types among teachers. Using this approach, teachers' motivation was examined via a global self-determined motivation factor and four specific factors of identified regulation, introjected regulation, external regulation, and amotivation. Findings demonstrated that teachers' perceptions of leadership practices were relevant for the motivation factors, and that global self-determined motivation was linked with all outcomes. In addition, two of the specific factors were uniquely associated with outcomes beyond the role of the global factor. Together, results highlight the importance of efforts to support teacher motivation—particularly, global self-determined motivation. For theory, findings align well with core tenets of SDT and also reaffirm the central role of self-determination that underlies the SDT motivation types—including how this may be a necessary and consistent focus in intervention efforts.

Declaration of competing interest

The author reports no conflicts of interest.

Data availability

The authors do not have permission to share data.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tate.2023.104348.

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