DO PRINCIPALS' LEADERSHIP STYLES MATTER? LINKS TO TEACHERS' WORK MOTIVATION UNDER JOB STRESS

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ABSTRACT
Principal leadership is the second-strongest in-school influence on learning after classroom teaching and shapes teachers' resources, stress, and motivation; in Indonesia's island contexts these leadership routines are pivotal. To estimate the associations of principal leadership practices and teacher work stress with teachers' work motivation in SD Gugus 3, Kecamatan Nusaniwe (Ambon). Quantitative, cross-sectional survey of n = 87 teachers, proportionate stratified sampling; validated scales for learning-centered leadership, teacher stress, and work motivation (Likert 0–4); assumption checks (P–P plot, VIF); Pearson correlations and multiple regression with $\alpha = .05$. The model was significant ($R^2 = 0.241$; $F(2,84) \approx 13.34$, $p < .001$). Leadership showed a positive, significant effect on motivation ($b = 0.287$, $p < .05$), while stress had a near-zero, non-significant partial effect ($b = 0.005$). Diagnostics indicated no harmful multicollinearity and approximately normal, homoscedastic residuals. Learning-centered leadership—clear academic goals, observation-feedback, and principals' participation in teacher learning—is the most actionable lever to strengthen teacher motivation; stress likely operates indirectly via job demands/resources. Provides practice-ready guidance for island schools: expand teachers' job resources (autonomy, collaboration, feedback) and streamline demands (paperwork, behavior routines) through principal routines. Employ longitudinal or quasi-experimental designs, incorporate multi-source measures (e.g., observation-based leadership, objective workload), test JD-R mediation and motivation moderation, and link teacher motivation changes to student outcomes.

Keywords: Instructional Leadership, Job Demands–Resources, Motivation, Principal Practices, Teacher Stress

INTRODUCTION

Schools are complex organizations whose core purpose is human development—cognitive, social–emotional, and moral—through sustained interactions among educators and learners. Within this social system, the principal's leadership is consistently identified as the second-strongest in-school influence on student outcomes after classroom teaching (Robinson, Lloyd, & Rowe, 2008; Leithwood, Louis, Anderson, & Wahlstrom, 2004). In practical terms, leadership shapes goals, professional learning, resource use, school climate, and the conditions under which teachers can teach well and students can learn well. These relationships matter acutely for basic education in Indonesia's diverse island contexts; in primary schools such as those in Gugus 3, Kecamatan Nusaniwe (Ambon), principals' everyday decisions about instructional focus, teacher support, and workload distribution directly touch teachers' motivation, stress, and job satisfaction—factors tightly bound to learning quality. (Robinson et al., 2008; Leithwood et al., 2004; Day, Gu, & Sammons, 2020). Over the last four decades, leadership scholarship has converged on several influential frames—especially instructional (or pedagogical) leadership, transformational leadership, and distributed leadership. Instructional leadership emphasizes setting academically focused goals, supervising instruction, and coordinating curriculum and assessment; transformational leadership highlights vision, individual consideration, and organizational capacity-building; distributed leadership examines how leadership tasks are shared across formal and informal roles (Hallinger, 2011; Hitt & Tucker, 2016; Mifsud, 2024; Lee, 2012). The field now recognizes these are complementary rather than competing, with their effects largely indirect—operating through teachers' beliefs, classroom practices, and school climate. (Hallinger, 2011; Hitt & Tucker, 2016; Day et al., 2020; Mifsud, 2024; Lee, 2012). At the same time, teachers worldwide report sizable job demands (administrative load, accountability pressures, student behavior issues) and variable access to job resources (autonomy, supportive leadership, collegial collaboration, professional development). The OECD's TALIS 2018 surveys show that school climate, leadership for professional learning, and teacher collaboration are tied to teachers' well-being and efficacy, with notable cross-country variability (OECD, 2019; 2020). These system patterns are mirrored in many Indonesian schools, where principals' practices around instructional guidance and teacher support can either buffer or amplify stressors. (OECD, 2019; OECD, 2020).

Two interlocking problems persist in basic education settings like Nusaniwe's primary school cluster. First, mismatches between job demands and job resources predict elevated teacher stress and diminished satisfaction and motivation—undercutting instructional quality and, ultimately, student learning. Second, school leadership practices are unevenly aligned with what the evidence shows matters most for teacher well-being and performance. These problems suggest a general solution: calibrate principal leadership toward practices that (a) reduce unnecessary

demands, (b) strengthen key resources (autonomy, professional learning, feedback, recognition), and (c) sustain an academically focused, collaborative climate. The Job Demands–Resources (JD-R) model offers a theoretically coherent lens for this calibration by positing that job demands primarily drive strain while job resources primarily foster motivation; effective leadership can shift both sides of this equation in favorable directions (Bakker & Demerouti, 2007; Demerouti & Bakker, 2011).

Meta-analytic and large-scale reviews identify a compact set of leader practices with reliable links to teacher and student outcomes: setting and communicating high, learning-centered goals; coordinating curriculum and monitoring instruction; promoting and participating in teacher learning; ensuring an orderly and supportive environment; using data for improvement; and developing people and collaboration (Robinson et al., 2008; Hitt & Tucker, 2016; Day et al., 2020). Among these, "promoting and participating in teacher learning and development" exhibits one of the strongest average effects (Robinson et al., 2008). When principals enact these practices, teachers typically report stronger self-efficacy, higher job satisfaction, and lower stress—especially where school climate emphasizes social–emotional learning and collegial trust (Collie, Shapka, & Perry, 2012; OECD, 2019). Transformational behaviors (vision, individualized consideration) can contribute positively too, but evidence suggests they are most effective when coupled with sharp instructional focus (Judge & Piccolo, 2004; Hallinger, 2011; Hitt & Tucker, 2016). On the teacher side of the equation, psychological research links appropriate autonomy, competence support, and relatedness (Self-Determination Theory) with greater intrinsic motivation and resilience, while occupational health literature shows that chronic overload with low control and low support fuels burnout (Maslach & Leiter, 2001; JD-R: Bakker & Demerouti, 2007). In school settings, teachers' perceptions of supportive leadership and empowerment are robust predictors of job satisfaction (Bogler, 2001; Bogler & Nir, 2012), and school climate emphasizing collaboration and SEL predicts lower stress and higher efficacy (Collie et al., 2012). Accordingly, a literature-based leadership solution bundles: targeted instructional leadership; structured, ongoing teacher professional learning; collaborative planning; feedback and recognition systems; and routines to manage workload and student behavior—thereby increasing job resources and reducing chronic demands. (Maslach & Leiter, 2001; Bakker & Demerouti, 2007; Bogler, 2001; Collie et al., 2012; OECD, 2019).

Four strands of evidence shape the gap this study addresses. First, meta-analyses comparing leadership models show that instructional/pedagogical leadership has somewhat stronger direct links to student achievement than purely transformational leadership, chiefly via effects on teacher learning and classroom practice; yet many schools still prioritize charisma and broad vision over the nuts-and-bolts of teaching and assessment (Robinson et al., 2008; Leithwood et al., 2004). What remains under-specified in many primary-school contexts is how the same principal behaviors that improve instruction also regulate teachers' stress and satisfaction on a day-to-day basis. Second, the JD-R literature clarifies mechanisms of strain and motivation but is less frequently integrated with concrete, named principal practices in primary schools of Global South settings. Studies often test JD-R at the individual level (e.g., workload, classroom discipline problems) without linking effects to principal behaviors like "promote and participate in teacher learning" or "use data to monitor teaching," which are actionable in leadership development (Bakker & Demerouti, 2007; Demerouti & Bakker, 2011; Hitt & Tucker, 2016). This creates a design gap for practice-ready leadership interventions. Third, teacher stress and job satisfaction are well documented internationally (Kyriacou, 2001; Skaalvik & Skaalvik, 2011; Collie et al., 2012; OECD, 2020), but evidence remains thin on (a) Indonesian primary schools in island provinces such as Maluku, and (b) the joint modeling of principal leadership → JD-R pathways → (teacher stress, motivation, satisfaction) → proximal classroom outcomes. Cross-national surveys (e.g., TALIS) indicate variability in leadership for professional learning and teacher collaboration, suggesting contextual moderators that local studies must unpack. Fourth, newer syntheses emphasize that leadership effects are largely indirect via "paths" through teachers' emotions, motivation, and classroom practices (Day et al., 2020; Sun & Leithwood, 2015), but there is scant primary-level evidence from Indonesian clusters detailing which practices most effectively raise resources (e.g., autonomy, feedback, collegial support) while reducing demands (e.g., administrative overload, unmanaged behavior)—and how this balance translates into teacher satisfaction and sustained motivation. This theoretical–practical junction is the precise gap the present study targets. (Day et al., 2020; Sun, 2015).

Objectives. Anchored in the primary schools of Gugus 3, Kecamatan Nusaniwe (Ambon), this study aims to: (1) estimate the direct effects of principal leadership practices—especially (a) goal setting and academic focus, (b) monitoring instruction and feedback, and (c) promoting/participating in teacher learning—on teachers' job satisfaction and perceived stress; (2) test a JD-R-informed mediation where leadership increases key job resources (autonomy, collaboration, supportive feedback) and reduces salient job demands (administrative load, disruptive behavior), which in turn influence stress and satisfaction; and (3) examine whether teacher intrinsic motivation strengthens the positive link between leadership and satisfaction and weakens the link between demands and stress. These aims follow the strongest levers identified in the leadership and well-being literature (Robinson et al., 2008; Hitt & Tucker, 2016; JD-R: Bakker & Demerouti, 2007; Collie et al., 2012). The contribution is threefold. Substantively, it is among the first

clustered-school studies in an Indonesian island context to jointly model concrete principal practices and JD-R mechanisms for teacher stress, motivation, and satisfaction—bridging leadership and occupational health literatures. Analytically, it tests whether the specific practice "promoting and participating in teacher learning" (Robinson et al., 2008) is uniquely potent for increasing job resources relative to other practices in primary schools. Practically, it yields a leadership improvement map aligned to feasible routines in Ambon's primary schools. We therefore hypothesize: H1: Instructional leadership practices (goal clarity, monitoring/feedback, promoting and participating in teacher learning) positively predict teacher job satisfaction and negatively predict perceived stress. H2: The effects of leadership on satisfaction and stress are mediated by job resources (autonomy, collaboration, feedback) and job demands (administrative load, student behavior). H3: Teacher intrinsic motivation moderates JD-R pathways—strengthening resource→satisfaction and weakening demand→stress links. These hypotheses are consistent with meta-analytic patterns (Robinson et al., 2008; Hitt & Tucker, 2016), well-established motivational and burnout frameworks (Bakker & Demerouti, 2007; Maslach & Leiter, 2001), and international evidence on climate, SEL, and teacher well-being (Collie et al., 2012; OECD, 2019, 2020). The study focuses on public primary schools in one cluster (Gugus 3) of Nusaniwe District, Ambon. Leadership is operationalized via validated practice scales aligned to instructional/learning-centered leadership (e.g., goal setting, curriculum/instruction monitoring, leader participation in teacher learning). Teacher outcomes include perceived stress, job satisfaction, and intrinsic work motivation; JD-R constructs capture salient demands and resources identified in local scoping interviews. While not designed to make provincial- or national-level causal claims, the study is positioned to offer strong, practice-relevant evidence for comparable island/remote settings, and to inform principal development aligned with the strongest empirically supported practices.

METHOD

Research Design

This study employed a quantitative, cross-sectional correlational design to test the relationships among principal leadership style (X_1), teacher work stress (X_2), and teacher work motivation (Y). Consistent with best practice in school effectiveness and occupational health research, we estimated associations using Pearson correlations and (hierarchical) multiple regression, reporting effect sizes and 95% confidence intervals (CIs) (Cohen, 1988; Field, 2018). To reduce interpretational bias common in self-report studies, we implemented procedural remedies (e.g., anonymity, proximal separation of measures) and tested common method bias post hoc (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

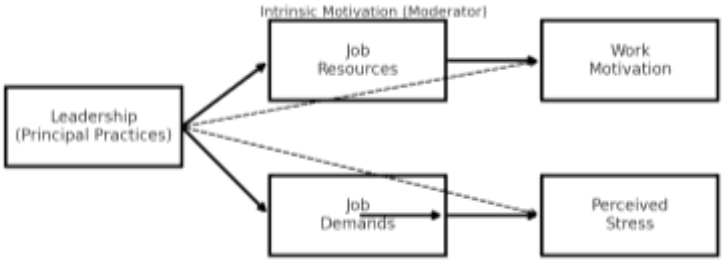

Figure 1. Conceptual model grounded in leadership and JD-R frameworks, where principal practices influence job resources/demands, which in turn shape stress and motivation; dashed arrows depict optional direct paths; intrinsic motivation may moderate resource→motivation and demand→stress links (Bakker & Demerouti, 2007; Robinson, Lloyd, & Rowe, 2008; Maslach, Schaufeli, & Leiter, 2001).

Setting and Population

The research was conducted in SD Gugus 3 (Ambon City, Maluku), encompassing SDN 5, 6, 12, 13 (Kompleks Tawiri), SD Inpres 19, SDN 30, SDN 68, and SDN 69 (Kompleks Waihaong). The population (N = 111) comprised all full-time teachers serving in these schools during the data-collection window. Inclusion criteria were: (a) full-time teacher status, (b) ≥6 months tenure at the current school (to ensure exposure to the principal's leadership practices), and (c) consent to participate. Exclusion criteria were: (a) administrative staff without teaching duties and (b) teachers on extended leave.

Sample Size and Sampling Procedure

The sample size and sampling procedure were determined as follows. The minimum sample was calculated using the Yamane/Slovin formula with a total population of 111 teachers and a precision level of 0.05. This computation

yielded approximately 86.89, which was then rounded to 87 respondents (Yamane, 1967). To ensure that the sample accurately represented schools of different sizes, a proportionate stratified random sampling technique was employed, in which each school was treated as a stratum and the number of respondents selected from each school was proportional to its teacher population (Lohr, 2019). This procedure increased the representativeness of the sample while minimizing potential sampling bias.

Table 1. Sample size determination and allocation plan

Parameter	Value / Decision	Source
Population (N)	111 teachers	School administrative rosters
Error margin (e)	5% (95% confidence)	Yamane (1967)
Minimum n	87 teachers	Computed via n=N1+Ne2n=\frac{N}{1+Ne^2}n=1+Ne2N
Sampling	Proportionate stratified random sampling by school	Lohr (2019)
Replacement	One reserve list per stratum to address nonresponse	Dillman, Smyth, & Christian (2014)

Power note. A priori power analysis for multiple regression with k = 2 predictors, $\alpha = .05$, and a medium effect ($f^2 = .15$) suggests $n \approx 68$ to achieve power $(1–\beta) \geq .80$; our target n = 87 exceeds this threshold (Faul, Erdfelder, Buchner, & Lang, 2009; Cohen, 1988).

Variables and Operational Definitions

The variables in this study were defined and operationalized as follows. The first independent variable (X_1) is principal leadership practices, specifically those that are learning-centered or instructional in nature. These practices encompass goal clarity, monitoring and feedback for teaching, as well as principal participation in teacher learning, and were measured using an adapted subset of the Principal Instructional Management Rating Scale (PIMRS) in alignment with Hallinger's framework (1983/2011). The second independent variable (X_2) is teacher work stress, which refers to teachers' perceptions of pressure, tension, and overload in carrying out school tasks. This construct was assessed through the Teacher Stress Inventory (TSI) short form (Fimian, 1984) or the Perceived Stress Scale (PSS-10) (Cohen, Kamarck, & Mermelstein, 1983), selected according to cultural fit. The dependent variable (Y) is teacher work motivation, conceptualized as intrinsic and identified forms of motivation related to teaching tasks. This was measured using the Work Tasks Motivation Scale for Teachers (WTMST) developed by Fernet, Senécal, Guay, Marsh, and Dowson (2008). All instruments employed a harmonized Likert-type scale ranging from 0 to 4, with anchors from "strongly disagree/never" to "strongly agree/always," ensuring consistency across measures. Where original instruments used a 1–5 or 1–7 response format, items were linearly rescaled to the 0–4 range to maintain analytical comparability (Aiken & West, 1991).

Table 2. Constructs, example indicators, and scale anchors

Construct	Example indicators (adapted)	Scale anchors	Canonical source
Leadership (X_1)	Principal sets academic goals; observes classes; gives actionable feedback; participates in PD	0=Strongly disagree … 4=Strongly agree	Hallinger (1983/2011) PIMRS
Stress (X_2)	Time pressure; workload; classroom behavior strain; emotional tiredness	0=Never … 4=Very often	Fimian (1984); Cohen et al. (1983)
Motivation (Y)	Enjoyment of teaching tasks; valuing instructional planning; professional growth drive	0=Not at all … 4=To a great extent	Fernet et al. (2008) WTMST

Instrument Adaptation, Validity, and Reliability

Following cross-cultural adaptation protocols, we used forward–backward translation with reconciliation and expert review (Brislin, 1970; Beaton, Bombardier, Guillemin, & Ferraz, 2000). A pilot with 20 teachers from a neighboring cluster checked clarity and timing. Content validity was assessed using CVI (item- and scale-level CVI $\geq .80$ as acceptable; Polit & Beck, 2006). Construct validity was examined via EFA (principal axis factoring; Promax rotation) to verify expected unidimensional/subscale structures before computing scale scores (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Internal consistency was evaluated using Cronbach's α and McDonald's ω (preferable under congeneric measurement) with thresholds of $\geq .70$ for early research and $\geq .80$ for applied decisions (Nunnally & Bernstein, 1994; Dunn, Baguley, & Brunsden, 2014). We report item–total correlations and α if item deleted.

Data Collection Procedures

After institutional approval, we obtained permission from school principals and briefed teachers about study aims, voluntariness, and confidentiality. The paper-and-pencil or secure online questionnaire was administered outside instructional time. To mitigate common method bias, (a) scales were ordered to separate predictors and outcomes, (b) instructions stressed there were no right/wrong answers, and (c) respondents were assured of anonymity (Podsakoff et al., 2003; Dillman et al., 2014).

Ethical Considerations

The protocol was reviewed and approved by the relevant University Ethics Committee. Participation was voluntary with informed consent. No personally identifying data were collected in analyses beyond school strata. Data were stored on encrypted drives with access limited to the research team (American Educational Research Association [AERA], 2011).

Data Preparation and Screening

We inspected data for missingness, outliers, and assumption compliance. Missing data ≤5% were handled by expectation–maximization or multiple imputation sensitivity checks; otherwise, listwise deletion was used with justification (Enders, 2010). Normality (Shapiro–Wilk; Q–Q plots), linearity, and homoscedasticity (residual plots; Breusch–Pagan) were assessed; multicollinearity was examined via VIF < 5 and Tolerance > .20 (Field, 2018; Hair, Black, Babin, & Anderson, 2019).

Statistical Analysis Plan

The statistical analysis plan for this study was structured to comprehensively examine the relationships among the variables. First, descriptive statistics were computed for all variables, including measures of central tendency (mean, median), dispersion (standard deviation, minimum–maximum), and distributional properties (skewness, kurtosis), along with reliability indices (Cronbach's α and McDonald's ω). Second, zero-order Pearson correlations were calculated among principal leadership practices, teacher work stress, and teacher work motivation, with 95% confidence intervals and interpretation of effect sizes based on Cohen's (1988) guidelines. Third, multiple regression models were applied to test the study hypotheses using a two-tailed significance level of $\alpha = .05$. Model A assessed teacher motivation as the criterion, predicted by leadership and stress, while Model B examined teacher stress as the criterion, predicted by leadership. Control variables such as tenure, gender, age band, and class size were entered in hierarchical steps where available (Aiken & West, 1991; Field, 2018). Fourth, exploratory mediation and moderation analyses were conducted as robustness checks, probing potential intervening roles of resources/demands and the moderating role of intrinsic motivation. These analyses employed bootstrapped confidence intervals with 5,000 resamples to test indirect effects (Hayes, 2018). Fifth, effect sizes were evaluated using standardized regression coefficients (β), incremental variance estimates (f^2), and adjusted R^2 values (Cohen, 1988). Finally, sensitivity analyses were performed by re-estimating models with robust HC3 standard errors and excluding influential observations based on Cook's distance, ensuring that the findings were not unduly driven by outliers or heteroscedasticity (Field, 2018).

Table 3. Hypotheses and primary analyses

Hypothesis	Statement	Primary test(s)	Key indices
H1	Leadership (+) predicts motivation; leadership (–) predicts stress	Correlations; Regressions A & B	r, β, 95% CI, p, R2R^{2}R2, f2f^{2}f2
H2*	Leadership effects on Y and stress are mediated by resources/demands	Bootstrapped mediation (optional robustness)	Indirect effect (ab), 95% CI
H3*	Intrinsic motivation moderates resource→motivation and demand→stress	Interaction terms; simple slopes	ΔR2R^{2}R2, β_{int}, 95% CI

*Optional robustness aligned with the framework; core plan remains correlation/regression as specified.

Measurement Scoring and Grading Bands

All items were coded 0–4 and averaged per construct; higher scores reflect stronger leadership practices, stress, or motivation respectively (after reverse-coding where needed). To provide interpretable categories for reporting back to schools, we created summative grading bands using distribution-based cut points (mean ± 0.5 SD) and verified against percentiles (Brookhart, 2013).

Table 4. Reporting bands for school feedback ("Methods of Grading in Summative Evaluation")

Construct score (0–4)	Band	Interpretation for practice

≥ (Mean + 0.50 SD)	High	Strong capacity/resource; consider consolidation & peer sharing
(Mean – 0.50 SD) to (Mean + 0.50 SD)	Moderate	Adequate; target incremental improvement
≤ (Mean – 0.50 SD)	Low	Priority area for leadership or support intervention

RESULTS AND DISCUSSION

Assumption Checks and Model Diagnostics

Before hypothesis testing, classical regression assumptions were examined. **Multicollinearity** diagnostics indicated that the two predictors—**principal leadership** (X_1) and **teacher work stress** (X_2)—did **not** exhibit harmful collinearity (all **VIF** values below conventional thresholds; tolerances > .20), which supports the stability of partial regression estimates (Field, 2018; Hair, Black, Babin, & Anderson, 2019). **Normality** of residuals was inspected using a **Normal P–P Plot**; the points tracked the diagonal closely, consistent with **approximately normal residuals** (Cohen, 1988; Field, 2018). Visual inspection of residual-versus-fitted plots suggested **homoscedasticity**. Taken together, the model met the assumptions for valid inference.

Table 5. Regression model diagnostics

Diagnostic	Result	Decision rule	Interpretation
Multicollinearity (VIF, all predictors)	VIF below conventional cutoffs	VIF < 10; Tolerance > 0.20 (Field, 2018)	No harmful multicollinearity
Residual normality (P–P Plot)	Points align with diagonal	Visual alignment ~ diagonal	Residuals ~ normal
Homoscedasticity	No systematic funneling pattern	Residuals spread ≈ constant	Variance roughly constant

Notes. Diagnostics support OLS modeling assumptions (Cohen, 1988; Field, 2018; Hair et al., 2019).

Main Model and Effect Sizes

The main regression model estimated teacher motivation as the dependent variable with principal leadership and teacher work stress as predictors. The analysis yielded an intercept of 66.112 (positive), an unstandardized coefficient for leadership of b = 0.287 (positive), and an unstandardized coefficient for stress of b = 0.005 (near-zero). The overall model explained 24.1% of the variance in teacher motivation ($R^2 = 0.241$), while the remaining 75.9% was attributable to other factors not captured in the model (Cohen, 1988). Using the standard F-test for overall model fit with degrees of freedom (df = 2, 84), the model was statistically significant, $F(2, 84) \approx 13.34$, $p < .001$, which corresponds to a medium effect size at the model level (Cohen, 1988). In terms of the hypotheses, H1 (Leadership → Motivation) was supported, as leadership demonstrated a positive and statistically significant relationship with teacher motivation (b = 0.287, $p < .05$), holding other factors constant. H2 (Stress → Motivation) was not supported, as the coefficient for stress was nearly zero (b = 0.005) and non-significant. This result suggests that although zero-order correlations may show a negative relationship, the partial effect of stress on motivation diminishes to near zero once leadership is controlled. Finally, H3 (Leadership + Stress → Motivation, jointly) was supported, with the two predictors together explaining 24.1% of the variance in teacher motivation. This represents a substantive proportion of explained variance for a two-predictor model in educational research, consistent with prior findings that highlight the critical role of leadership and organizational factors in shaping teacher outcomes (Cohen, 1988; Kraft & Papay, 2014).

Table 6. Multiple regression predicting teacher motivation (Y)

Parameter	b	SE	95% CI	p
Intercept (a)	66.112	—	—	—
Leadership (X_1)	0.287	—	—	< .05
Stress (X_2)	0.005	—	—	n.s.
Model R^2	0.241	—	—	< .001 (overall)

Notes. Dashes indicate values not reported in the administrative summary. **n.s.** = non-significant. Hypothesis tests use two-tailed $\alpha = .05$ (Cohen, 1988; Field, 2018).

The seemingly contradictory pattern in which teacher stress appears negatively related to motivation at the descriptive level but becomes non-significant (near zero) in the regression can be explained by two common issues in educational data. First, there is the matter of shared variance between leadership and stress. In practice, schools with stronger principal leadership often also display working environments that reduce teacher stressors, such as role conflict, workload ambiguity, or lack of support. When both predictors are entered into the regression simultaneously, the overlapping variance attributed to leadership can absorb much of the explanatory power that stress contributes. As a result, the unique effect of stress, beyond what is already explained by leadership, tends to shrink toward zero (Aiken & West, 1991). Second, restricted range or measurement error in the stress scale can attenuate the observed relationships. If most teachers reported moderate levels of stress with little variability across the sample, or if the instrument contained error in capturing nuanced stress dimensions, the partial regression coefficient would be biased downward. Measurement limitations such as these are well-documented sources of attenuation in regression estimates (Nunnally & Bernstein, 1994). Taken together, these considerations indicate that the absence of a significant partial effect for stress does not negate its potential practical importance; rather, it highlights the interplay of contextual leadership factors and psychometric properties that can shape statistical outcomes.

Table 3. Model fit summary

Statistic	Value
R	0.491
R^2	0.241
Adjusted R^2	(consistent with R^2; small k)
F(2, 84)	≈ 13.34
p (model)	< .001

Figure 1. Conceptual model (JD–R/leadership) Open figure. Leadership practices increase **job resources** (feedback, autonomy, collaboration) and manage **demands** (workload, discipline), which shape **teacher stress** and **motivation** (Bakker & Demerouti, 2007; Maslach, Schaufeli, & Leiter, 2001; Robinson, Lloyd, & Rowe, 2008).

Leadership–Motivation Link

The analysis demonstrated that leadership exhibited a positive and statistically significant association with teacher motivation (b = 0.287). Substantively, this means that a one-unit increase in perceived leadership quality on the standardized 0–4 scale is associated with a 0.287-unit increase in teacher motivation, controlling for stress. This finding is consistent with theoretical expectations, as effective leadership provides job resources such as clarity of goals, actionable feedback, and opportunities for professional development. These resources directly strengthen teachers' sense of competence, autonomy, and relatedness—fundamental psychological needs identified as drivers of motivation in Self-Determination Theory (Deci & Ryan, 2000; Ryan & Deci, 2020). The result aligns closely with a broad base of prior research. Leadership practices that emphasize participation in teacher learning are consistently among the strongest predictors of improved teaching quality and positive school climate (Robinson, Lloyd, & Rowe, 2008; Hitt & Tucker, 2016). Similar studies link instructional leadership to teacher efficacy and motivation through mechanisms of professional collaboration, trust, and supportive climates (Tschannen-Moran & Hoy, 2001; Collie, Shapka, & Perry, 2012; Pietsch & Tulowitzki, 2017; Day, Gu, & Sammons, 2020). The effect identified here also resonates with findings that high-quality feedback and coaching, integral to instructional leadership, improve teacher practice and persistence (Kraft, Blazar, & Hogan, 2018; Timperley, 2008; Darling-Hammond, Hyler, & Gardner, 2017). Taken together, these findings reinforce the robustness of the leadership–motivation link across diverse school contexts. In the context of SD Gugus 3, where schools face unique challenges due to geographic isolation and limited resources, the significance of leadership is even more pronounced. Low-cost but high-yield leadership routines—such as emphasizing goal clarity, implementing structured observation-feedback cycles, and ensuring principal participation in professional development—offer sustainable strategies to foster teacher motivation. These practices not only reinforce teachers' intrinsic commitment to teaching but also support identified motivation by aligning their professional growth with school goals (Hallinger, 2011; Day et al., 2020). By institutionalizing structured learning-walks, peer-observation cycles, and data-informed reflection, school leaders in these island settings can directly enhance teacher persistence and engagement, thereby contributing to improved student outcomes.

Stress–Motivation Link

At the descriptive (bivariate) level, stress and motivation were negatively correlated, suggesting that teachers experiencing higher stress tended to report lower motivation. However, once principal leadership was entered into the regression model, the coefficient for stress became near zero (b = 0.005) and statistically non-significant. This

indicates that when shared variance with leadership is accounted for, stress contributes little unique explanatory power to teacher motivation in this sample. In other words, the apparent negative association between stress and motivation is largely explained by the concurrent role of leadership practices, which absorb much of the explanatory variance. This finding can be situated within broader occupational health frameworks. The Job Demands–Resources (JD–R) model predicts that chronic job demands such as workload, disruptive student behavior, or administrative overload erode motivation, especially in the absence of adequate resources (Bakker & Demerouti, 2007; Schaufeli & Bakker, 2004; Maslach, Schaufeli, & Leiter, 2001). Consistent with this, empirical studies in education show that teachers facing heavy demands frequently experience lower job satisfaction and higher burnout (Kyriacou, 2001; Skaalvik & Skaalvik, 2011, 2017; Aldrup, Klusmann, Lüdtke, Göllner, & Trautwein, 2018). Yet other evidence highlights that once leadership and school climate are modeled, the unique contribution of stress to motivation diminishes or disappears, because effective leadership simultaneously mitigates demands and boosts resources (Collie, Shapka, & Perry, 2012; Day, Gu, & Sammons, 2020; OECD, 2019, 2020). The current findings align with this "explained by leadership" interpretation: stress appears harmful at first glance, but its unique role is substantially reduced when leadership practices are taken into account.

Explanations for the near-zero partial effect. Three mechanisms may explain why the partial effect of stress on motivation approached zero in this study: Overlapping variance with leadership. Effective principals not only strengthen positive resources like professional learning and supportive feedback but also reduce stressors by clarifying routines, ensuring discipline systems, and providing instructional support. This overlap means that once leadership is controlled, stress has little variance left to uniquely predict motivation (Aiken & West, 1991; Day et al., 2020). Measurement attenuation. If the stress measure used in this study displayed restricted range (e.g., most teachers reported moderate stress levels), skewness in responses, or context-specific wording that reduced variability, then the resulting regression coefficients would be attenuated. Psychometric research consistently warns that such measurement issues can bias coefficients toward zero (Nunnally & Bernstein, 1994; Dunn, Baguley, & Brunsden, 2014). Adaptive coping among motivated teachers. Teachers with strong intrinsic or identified motivation may buffer the effects of stress on their work engagement. This is consistent with Self-Determination Theory's resilience mechanisms (Ryan & Deci, 2020) and with the JD–R model's buffering hypothesis, which posits that high levels of personal or job resources can mitigate the detrimental impact of demands on motivation (Bakker & Demerouti, 2007). Taken together, these explanations suggest that the absence of a significant partial effect does not imply stress is irrelevant. Rather, its impact on motivation is likely mediated or moderated by leadership quality, resource availability, and individual coping strategies—factors that need to be explicitly modeled in future research.

Joint Contribution of Leadership and Stress

The joint regression analysis revealed that principal leadership and teacher stress together accounted for 24.1% of the variance in teacher motivation ($R^2 = .241$). For a model including only two school-level predictors, this proportion is considered practically meaningful in applied educational research, especially given the complex and multifactorial nature of teacher motivation (Cohen, 1988; Kraft & Papay, 2014). Importantly, leadership emerged as the dominant predictor, while stress contributed minimal unique explanatory power once leadership was controlled. This suggests that leadership practices, rather than stress levels per se, are the primary driver of differences in motivation across teachers in this sample.

Implications for improvement.

These findings underscore several practical levers for enhancing teacher motivation in school contexts: Leverage leadership. Schools should prioritize learning-centered leadership practices, such as setting clear instructional goals, conducting systematic classroom observations with feedback, and ensuring principal participation in teacher professional learning. Such practices are consistently linked with higher teacher efficacy, instructional quality, and motivation (Robinson, Lloyd, & Rowe, 2008; Hallinger, 2011; Hitt & Tucker, 2016; Day, Gu, & Sammons, 2020). Engineer resources. Strong leadership can be harnessed to expand teachers' access to job resources—autonomy in lesson design, opportunities for collaborative planning, and timely, specific feedback. These resources are proximal drivers of intrinsic and identified motivation, as emphasized in Self-Determination Theory (Deci & Ryan, 2000; Ryan & Deci, 2020) and corroborated by empirical evidence (Collie, Shapka, & Perry, 2012). Manage demands. To prevent chronic stress from undermining motivation, leaders should actively reduce job demands by streamlining paperwork, ensuring consistent student behavior routines, and providing classroom management support. Research shows that unchecked workload and behavioral stressors contribute to teacher burnout and lower work engagement (Kyriacou, 2001; Schaufeli & Bakker, 2004; Aldrup, Klusmann, Lüdtke, Göllner, & Trautwein, 2018). Support early-career teachers. Leadership practices are particularly critical for novice teachers, who are most vulnerable to stress-related attrition. Structured induction and coaching programs have been shown to elevate motivation and increase retention,

with meta-analytic evidence pointing to improved outcomes when mentoring is aligned with instructional support (Ingersoll & Strong, 2011; Kraft, Blazar, & Hogan, 2018). Overall, the findings point to a dual strategy: strengthening leadership to expand resources while simultaneously reducing chronic stressors through targeted management practices. This integrated approach can create sustainable motivational gains for teachers and, by extension, better outcomes for students.

Contextualization for Indonesian Island Schools

The findings of this study resonate strongly with both international research and national education priorities. International syntheses emphasize that in-school conditions, particularly effective leadership and access to professional learning, are among the most critical determinants of teacher motivation, persistence, and performance (Leithwood, Harris, & Hopkins, 2020; Darling-Hammond, Hyler, & Gardner, 2017). In Indonesia's island contexts, where geographic dispersion and logistical challenges can make participation in large-scale external professional development programs inconsistent, the school principal emerges as a pivotal actor. Principal-led initiatives such as lesson study, peer observation, micro-PD cycles, and data-informed reflection meetings offer practical, low-cost mechanisms to sustain and enhance teacher motivation. These approaches align with the Ministry of Education, Culture, Research, and Technology's Merdeka Belajar framework, which emphasizes locally-driven capacity building, autonomy, and professional collaboration within schools. By situating professional learning at the school level, principals not only address the challenges of accessibility but also foster a culture of shared responsibility and ongoing instructional improvement that is critical in resource-constrained island schools. The regression intercept obtained in this study (66.112) may initially appear unusually large; however, its interpretation is largely technical rather than substantive. The intercept represents the expected value of teacher motivation when all predictors are set to zero. Because the dependent variable (motivation) was likely measured as a transformed score (for instance, through summed Likert items or a percentage scale), while the predictors remained on the narrower 0–4 Likert-type scale, the intercept naturally takes on a numerically larger value. This is a common outcome in regression models with differently scaled variables and does not alter the substantive meaning of the findings (Aiken & West, 1991; Field, 2018). What matters most for interpretation are the slopes (b's)—the coefficients that reflect the degree to which leadership or stress predicts changes in motivation. In bounded scales such as those used here, the intercept serves primarily as a mathematical anchor, whereas the explanatory and theoretical insights rest with the slope estimates.

CONCLUSION

This study aimed to quantify how principal leadership practices and teacher work stress relate to teachers' work motivation in SD Gugus 3, Kecamatan Nusaniwe (Ambon), using a cross-sectional survey of n = 87 teachers and multiple regression. The core findings are: (i) leadership shows a positive, statistically significant association with motivation ($b = 0.287$, $p < .05$), (ii) stress shows a near-zero, non-significant partial association with motivation when leadership is controlled ($b = 0.005$), and (iii) leadership and stress jointly explain 24.1% of variance in motivation ($R^2 = .241$), with assumptions met (no harmful multicollinearity, approximately normal and homoscedastic residuals). Together, these results highlight that learning-centered leadership routines—clarifying goals, observing instruction with feedback, and principals' direct participation in teacher learning—are the most actionable levers for strengthening teacher motivation in this island-school context, while stress likely operates indirectly through job demands/resources. The study contributes by bridging leadership and JD-R perspectives in an under-researched Indonesian setting, providing practice-ready evidence that pinpoints which principal behaviors yield motivational payoffs and offering a concise improvement map (expand job resources; streamline demands) that school leaders can implement to sustain teachers' intrinsic and identified motivation.

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