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Examining the Relationship Between Leadership and Teachers' Moral Competence: The Mediating Role of Spiritual Climate

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Abstract

This research examines how workplace buoyancy, somatic burden, autonomy-supportive and autonomy-thwarting leadership styles, and spiritual climate influence the moral competency of teachers. It may ultimately contribute to the development of a positive education culture. Data was collected through a structured questionnaire completed by teachers. This study also involved machine learning techniques including Random Forest Regressor (RFR) and Gradient Boosting Regressor (GBR). These techniques aim to identify correlations between the variables. In addition, Structural Equation Modelling (SEM) was adopted to analyse direct and indirect effects. The results indicated that autonomy-supportive leadership has a positive impact on moral competence, while spiritual climate mitigates the negative impact of somatic burden on moral competence. GBR and RFR were used to evaluate features, consistently showing similar relationships, with RFR demonstrating better predictive power. This shows that the use of machine learning in analysing educational data retrieves deep patterns within the data sets. Collectively, the results of the current study imply the importance of organizational change to promote autonomy-supportive leadership and to improve the spiritual climate to increase teachers' moral competence. There is still room for further improvement concerning the generalization of results; therefore, further studies should use a larger sample of convenience. There is a need to examine other moderators, for instance, personality traits and to incorporate longitudinal designs to evaluate effects over time.

***Keywords*:** autonomy-supportive leadership, leadership styles, machine learning, moral competence, spiritual climate, workplace buoyancy

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Introduction

In shaping the success of individuals and institutions, the moral competency of teachers holds great importance as it can enhance student engagement. Teachers' moral competence is a critical factor which can shape the effectiveness of educational environments (Kuusisto & Tirri, 2019; Martins et al., 2021; Werang et al., 2024). This is because it directly influences the ability of teachers to make ethical decisions, foster positive relationships, and create a supportive atmosphere of learning. Its development is essential to enhance the overall performance of teachers. In the highly competitive education sector (Qudratova, 2024), ensuring teacher well-being and promoting a positive school climate is inevitable. Given its significant role in teacher motivation, satisfaction, and retention, it is important to understand the factors that contribute to moral competence. It can help address performance-related issues, such as burnout and attrition (Jackson, 2023). Thus, this study aims to explore these factors and their interplay in fostering moral competency, to improve educational practices and teacher support systems.

As a vital component of any educational institution, teachers must develop new approaches to enhance their technical skills, qualifications, and fundamental abilities in the workplace. They must also foster an attitude of flexibility that would help them build stronger bonds with students, co-workers, and upper management (Paul et al., 2020).

Workplace spirituality is a central theme in organizational behaviour. However, as an independent asset, workplace buoyancy is the ability to deal with adversities and problems at work efficiently. This skill is highly useful in overcoming job-related challenges (Collie, 2021). According to Ryan and Deci (2017), autonomy-supportive leadership comprises behaviours that encourage people to take charge of their own lives and feel empowered, while autonomy-thwarting leadership comprises behaviours that impose external authority and limit people's ability to make their own decisions (Ryan & Deci, 2017). Furthermore, somatic burden is associated with a decreased quality of life and is a typical feature of many physiological and mental disorders (Collie, 2024).

Previous studies showed that a variety of factors, such as workplace buoyancy, somatic burden, and autonomy-supportive and autonomy-thwarting leadership styles, can support or impede teachers' psychological

performance at work, which includes their overall health and inclination to quit (R. Collie, 2023). It is crucial to take various elements or factors into account simultaneously to determine which factors continue to be essential after accounting for others. These elements have, nevertheless, been found in other investigations. Therefore, it is unknown as to what degree these characteristics hold their significance when considered collectively. Previous studies in different contexts have examined spirituality, leadership styles, physical strain, and occupational buoyancy. Still, their influence on teachers' moral competence, taken as a whole, has not been studied. Furthermore, not much is known about how the spiritual environment serves as a mediator between moral competence and other aspects of the workplace.

Teachers who are given responsibility and autonomy are more devoted to the educational institute they work for and demonstrate their full potential. When teachers feel empowered to reflect on what they teach, use their authority, and assume responsibility for problems pertaining to their profession, they remain highly motivated and satisfied with their jobs (Ertürk, 2023). Wong et al. (2021) developed the idea/notion of teacher buoyancy to emphasize the importance of investigating how teachers handle the numerous and minor difficulties they face daily (Wong et al., 2021).

Attrition and teacher burnout continue to be problems in many education systems (Collie, 2024). On the other hand, spirituality in the workplace creates a sense of association, purpose, and direction for teachers, while advancing moral competency through common principles and group accountability (Paul et al., 2020). Regarding how workplace spirituality affects the above-mentioned factors and aids in developing teachers' moral competence, there remains a research gap in the existing body of literature. By providing an in-depth analysis of the function of all the above factors in boosting teachers' moral competence through a spiritual atmosphere at the workplace, this study seeks to close this gap. Burnout, as well as teacher discontent and turnover, are caused in part by problems with autonomy-thwarting leadership and excessive somatic burden. Schools that create a spiritual environment which fosters moral decision-making help students to be more involved and to learn. By means of Random Forest Regressor (RGR) and Gradient Boosting Regressor (GBR) models in educational machine learning research, this paper shows how AI-driven analytics could maximize teacher development programs. Using SEM,

RFR, and GBR, this study uses integrative modelling to determine the complex correlations between these factors.

The current study has the following research objectives:

RO1: To develop and validate a comprehensive analytical model of teachers' moral competence using Structural Equation Modelling (SEM), incorporating factors such as workplace buoyancy, somatic burden, autonomy-supportive and autonomy-thwarting leadership styles, and spirituality at work.

RO2: To assess the model results and apply machine learning algorithms (Random Forest and Gradient Boosting) to identify the key determinants of teachers' moral competence.

These are the most significant factors that require a focus on research, policy, and practice to enhance teachers' performance at work and minimize turnover. Finally, the current study assists in creating a framework that would enhance the moral standard, spiritual environment, and overall wellness of teachers in schools.

Literature Review

Teachers' moral competence is the dependent variable in this study. It has garnered significant attention in educational research due to its profound influence on educational outcomes (Hadiyan et al., 2022; Kasa et al., 2020). It plays an important role in determining teaching effectiveness, ethical decision-making, and the development of a positive teacher-student relationship (Kasa et al., 2020; Kusumaningrum et al., 2019). It is essential to foster a supportive and productive environment in the classroom. This is because teachers with high moral competency are better equipped to handle challenges, promote fairness, and serve as ethical role models (Sadapotto et al., 2022). Existing literature highlights the importance of moral competency in shaping teacher performance and well-being (Hashim, 2024; Tirri, 2023). However, there remains a gap in understanding the specific factors that contribute to its development. There is limited research available that examines how workplace buoyancy, somatic burden, and autonomy-supportive versus autonomy-thwarting leadership approaches collectively interact to influence moral competency. Furthermore, the mediating role of workplace spirituality (Kumar, 2018) in fostering moral competency also remains underexplored, despite its potential to enhance the

performance and ethical decision-making of teachers (Memduhoğlu & Dağ, 2024).

In the context of this research, workplace buoyancy refers to the ability of a teacher to adapt and overcome adversity in the work environment (Cheng et al., 2023; Zhi & Derakhshan, 2024). Collie (2021) stated that somatic burden refers to the experience of an individual regarding physical symptoms. It includes shortness of breath, joint or back pain, headaches, trouble speaking, and dizziness. Autonomy-thwarting leadership imposes external control (Collie, 2021; R. J. Collie, 2023). It thus limits the decision-making capacity of teachers. On the other hand, spiritual climate acts as a mediator in this study. Pandey et al. (2016) defined spiritual climate as the collective perception of employees regarding their workplace that facilitates "harmony" with the self through meaningful work. Individuals move beyond their limited sense of self and work in harmony with their social and natural surroundings. They feel a sense of connection with everything around them. It creates a sense of purpose, community, and ethical accountability in the workplace. It may also influence the development of moral competency. Each of these variables has been studied in the past literature individually (Chen et al., 2024; Hussain et al., 2024; Huyghebaert-Zouaghi et al., 2024; Vem et al., 2024; Zhi & Derakhshan, 2024). However, their collective impact on the moral competency of teachers has not been explored. Moreover, to the best of the current researcher's knowledge, the mediating role of spiritual climate also presents a significant gap in the literature. This study aims to fill this gap by investigating how these factors interact to shape moral competency. It aims to contribute to a deeper understanding of the drivers of teacher well-being and performance.

Theoretical Underpinnings

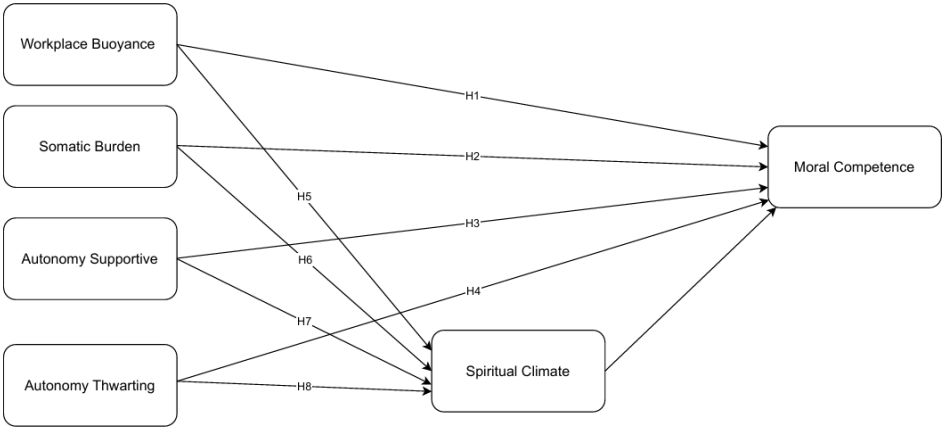
Given the concepts under discussion, it is possible to refer to the Self-Determination Theory (SDT) to define workplace buoyancy, somatic burden, and autonomy-supportive and autonomy-thwarting leadership styles as the aspects that contribute to the development of teachers' moral competence through a positive spiritual climate. SDT posits that human motivation and personality are driven by the fulfilment of three basic psychological needs, which include autonomy, competence, and relatedness (Ryan & Vansteenkiste, 2023). Workplace buoyancy, which refers to the concept of resilience, also complies with the concept of SDT as it seeks to

ensure that the individual's psychological needs are well supported, to maintain their intrinsic motivation and well-being (Li, 2022).

Moreover, SDT acknowledges the effects of physical and psychological needs on motivation and competent outcomes (Tang et al., 2020). A reduced level of somatic burden can help to reduce stress and physical exertion (Collie, 2021) and consequently, contributes to the satisfaction of psychological needs and an increase in moral competence. A spiritual climate helps in creating a feeling of relatedness as well as a sense of purpose within the framework of SDT for the best performance (Srivastava & Gupta, 2022; Suasthi, 2022). In this regard, the current model may elaborate on how positive characteristics within the workplace environment and in leadership approaches contribute to the psychological and moral growth of teachers and how spiritual climate acts as a crucial mediator based on SDT.

Figure 1

Conceptual Framework



Research Hypotheses Development

Prior research revealed that buoyancy in the workplace has a positive correlation with moral competence among educators. A study by Tang et al. (2023) revealed that teachers who undergo workplace buoyancy, which refers to the capability to cope effectively with difficulties, tend to have higher moral competence when making decisions and performing ethical actions in class. Similarly, Chen (2024) observed that when teachers have a

positive perception of the work environment as being supportive and buoyant, they are likely to depict greater ethical leadership and moral reasoning. In light of these findings, it can be concluded that a positive and strong climate in organizations promotes moral competence in educators as it makes available the necessary resources and encouragement to enable an effective approach to resolve the ethical issues involved.

H1: Workplace buoyancy positively impacts moral competence.

Prior research also established a strong correlation between the somatic burden (or the physical and emotional load) that teachers experience at the workplace and their moral competence. For instance, a study by Daniel and Van Bergen (2023) examined the effect of teacher burnout, which is one of the factors (of somatic burden) affecting moral decision-making in the class. Their study showed that teachers displaying increased burnout scores had decreased moral competence and practised ethical misconduct. Similarly, Shaukat et al. (2022) revealed that teachers who had lower somatic burden, lesser stress, and better physical and mental health, developed higher moral competence over the course of time, as compared to their peers who were under higher strain. Consequently, supporting teachers in addressing and reducing somatic burdens may be viewed as a plausible strategy to combat unethical actions and promote professional standards of conduct among educators.

H2: Somatic burden has a significant impact on moral competence.

Several empirical studies indicated that autonomy-supportive leadership is significantly related to the level of moral competence of individuals. For instance, Gurley and Dagley (2021) established in their study that increased self-proclaimed autonomy and support from leaders is associated with an improvement in the moral reasoning and ethicality of teachers. Similarly, Berkovich and Eyal (2021) suggested linking managerial support for autonomy to the gradual strengthening of teachers' moral perspective and ethical decision-making mechanisms. Furthermore, Nazaruddin, et al. (2020) noted a positive correlation between autonomy-supportive leadership and the moral competence of educators in ethical decisions, ethical reasoning, and ethical leadership behaviours. Altogether, these studies point out that leadership which promotes self-determination enhances moral competence among teachers due to its focus on them assuming ethical responsibility for their work.

H3: Autonomy-supportive leadership positively impacts moral competence.

Several researchers have provided empirical evidence to demonstrate that autonomy-thwarting leadership is harmful to developing the ethical and professional identity of teachers. For instance, Lowery (2020) conducted a study which showed that when teachers have authoritarian perceptions of leaders in their organizations, they tend to score poorly on moral reasoning and ethical decision-making on the job. In the same way, Hoque and Raya (2023) and Yalçınkaya et al. (2021) revealed that students from schools where principals used autocratic leadership approaches performed inequitably in their moral development and ethical reasoning after a certain period of time. Moreover, the teachers they managed similarly performed inequitably in displaying moral sensitivity and ethical behaviour. Besides, Murtagh and Dawes (2023) established a negative relationship between autonomy-thwarting leadership and teachers' moral competence across educational environments. Altogether, the above findings suggest that leadership behaviour that undermines teacher autonomy has a potential negative effect on their moral growth, underlining the necessity to develop supportive leadership behaviour.

H4: Autonomy-thwarting leadership negatively impacts moral competence.

In previous studies, researchers examined the impact of spiritual climate on workplace buoyancy and moral competence among educators. For instance, employees who perceived a positive role of spirituality regarding a sense of purpose, in addition to the appreciation of community, were found to have high moral competency (Paul et al., 2020; Webster & Litchka, 2020). Moreover, Liu et al. (2022) discussed the long-term effect of workplace buoyancy on moral competence under the condition of a spiritual workplace climate. Khaddam et al. (2023) found that spiritual climate plays a mediating role between workplace variables and educators' moral competence. Taken together, these studies underscore the necessity to consider spiritual climate as a mediator through which workplace buoyancy impacts the moral competence of teachers. This underscores the necessity to build a favourable spiritual environment in an educational context.

Employees with less stress and physical workload can more easily perceive a positive spiritual environment at their workplace (Wu et al., 2020), which also increases job satisfaction and motivation among teachers (Rahmati et al., 2018). Furthermore, Creaven (2022) also depicted that the

perception of a positive spiritual climate by an individual helps to moderate the somatic pressure with regard to moral competency. These findings highlight the spiritual climate's role in bridging somatic concerns with the moral growth of teachers and emphasize the need for a supportive spiritual atmosphere in educational settings.

Past research also addressed issues concerning autonomy-supportive leadership, spiritual climate, and moral competency of educators. For example, Zhu et al. (2022) stated that teachers who receive support from their leaders to encourage autonomy enjoy a positive spiritual environment within the workplace. Additionally, when the educators perceive the setting to be spiritually facilitative, it improves their ethical decision-making and practices based on the adoption of autonomy-supportive leadership (Khaddam et al., 2023; Meng et al., 2023; Zhu et al., 2022). These results strongly indicate that a spiritual climate is indeed the way through which autonomy-supportive leadership may affect the moral outcomes of teachers.

Significant attention has been directed to exploring the pervasive factors of autonomy-thwarting leadership, spiritual climate, and moral competency in educators. In this regard, Collie (2021) performed an investigation and found that the educators exposed to autonomy-thwarting leadership tend to hold a negative perception of the spiritual climate their workplace creates. In addition, autonomy-thwarting leadership was found to have a negative effect on the individual's ethical decision-making and overall ethical conduct (Love, 2023). Moreover, according to Johansen et al. (2023), autonomy-thwarting is related with the individual dysfunction.

The findings from the studies reviewed above support the importance of spiritual climate as a significant mediator that links autonomy-thwarting leadership to teachers' moral course of development, stressing the necessity of the creation of a beneficial spiritual climate in educational practice.

H5: Spiritual climate mediates the relationship between workplace buoyancy and moral competence.

H6: Spiritual climate mediates the relationship between somatic burden and moral competence.

H7: Spiritual climate mediates the relationship between autonomy-supportive leadership and moral competence.

H8: Spiritual climate mediates the relationship between autonomy-thwarting leadership and moral competence.

Methodology

Quantitative Research Method

This study employed a quantitative research design, which is well-suited for collecting and analysing numerical data to identify patterns, relationships, and trends within a population (Mohajan, 2020). Given the objective of this study—to establish generalizable findings regarding teachers' moral competence and well-being—quantitative methods were used to link workplace factors with moral development. This approach enabled the identification of workplace conditions which positively or negatively influence teachers' well-being and moral growth using statistical techniques for analysis.

Data Collection

Survey research was utilized to collect primary data, as it is effective in providing realistic insights within natural settings (Pandey & Pandey, 2021). A structured online questionnaire was administered to teachers across various educational institutions. The survey was designed to gather information on key variables, such as workplace buoyancy, somatic burden, leadership style (both autonomy-supportive and autonomy-thwarting), spiritual climate, and teachers' moral competence. The use of an online format facilitated data collection and allowed for more accessible participation by teachers. In a similar vein, Siraj et al. (2022) examined how leadership affects teachers' well-being. The researchers asked 350 teachers about their opinions of different leadership styles. The emphasis on the interaction between moral competency and leadership style demands a similar sample size, that is, between 350 and 400.

Measurement and Sampling

The target population consisted of teachers from a range of educational institutions in Pakistan. Convenience sampling was employed to make the selection process manageable and feasible. The study recruited teachers who were willing to participate and had the time to complete the survey. The participants came from diverse teaching backgrounds with varied experience to ensure a wide representation of perspectives. The measurement scales were adapted from the existing literature. The

respondents answered the survey using a 5-point Likert scale, which aligned with the study's objectives. The measurement scales and their sources are outlined in Table 1**.**

Table 1
Measurement Scales

Variable Name	Variable Type	Adopted From
Workplace Buoyancy	Independent	(Hussain et al., 2024)
Somatic Burden	Independent	(Collie, 2021)
Autonomy Supportive Leadership	Independent	(Collie, 2021)
Autonomy Thwarting Leadership	Independent	(Collie, 2021)
Moral Competence	Dependent	(Reynolds, 2008)
Spiritual Climate	Mediating	(Mohajan, 2020)

Data Analysis

The study utilized SPSS for descriptive analysis to summarize the dataset and identify key patterns. Structural Equation Modelling (SEM) was performed using SmartPLS to assess direct and indirect relationships among variables. Additionally, Python (Scikit-learn) was used to implement machine learning techniques, specifically Random Forest Regressor (RFR) and Gradient Boosting Regressor (GBR), to evaluate feature importance and predictive relationships within the dataset.

Data Exploration

Before proceeding with advanced modelling, the dataset was reviewed to ensure its completeness. Data was presented graphically through the creation of histograms and distribution plots of continuous variables.

Table 2
Overview of Dataset Features and Data Types

	SB5	SB6	SB7	SB8	MC	SC	ASL	ATL	WB	SB
0	5	5	5	5	5.0	5.0	5.0	5.0	5.0	5.0
1	5	5	5	5	5.0	5.0	5.0	5.0	5.0	5.0
2	5	5	5	5	5.0	5.0	5.0	5.0	5.0	5.0
3	4	4	4	4	3.0	2.0	2.0	5.0	5.0	4.0
4	4	4	4	4	1.0	1.0	1.0	5.0	5.0	4.0

Feature Encoding

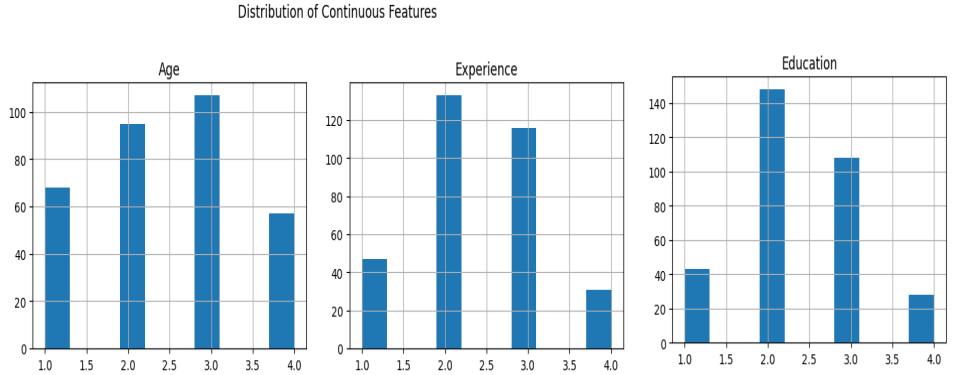
To prepare the dataset for machine learning (ML) algorithms, categorical variables were converted into numerical form. For instance, the gender variable was encoded using LabelEncoder, with 'male' as 1 and 'female' as 0.

Feature Importance

Feature importance refers to identifying the contribution of each feature to the model's predictions. In this study, the Random Forest Regressor (RFR) model was trained and feature importance was extracted using the 'feature_importances' attribute, which highlighted the most influential factors affecting teachers' moral competence.

Figure 2

Histogram/Distribution of Continuous Features

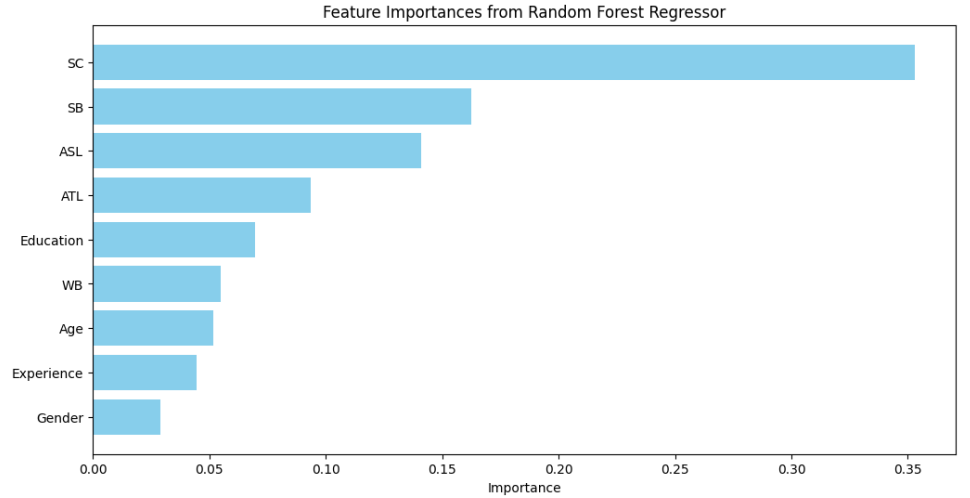


Feature Selection

In line with the study's focus on understanding the impact of workplace buoyancy, somatic burden, leadership styles, and spiritual climate on teachers' moral competence, moral competence was selected as the target variable. The predictor variables included age, experience, education, spiritual climate (SC), autonomy-supportive leadership (ASL), autonomy-thwarting leadership (ATL), workplace buoyancy (WB), and somatic burden (SB).

Figure 3

Determining Feature Importance through Random Forest Regressor



	Feature	Importance
4	SC	0.352921
8	SB	0.162480
5	ASL	0.140957
6	ATL	0.093680
3	Education	0.069508
7	WB	0.055034
1	Age	0.051789
2	Experience	0.044769
0	Gender	0.028862

Data Splitting

The data set was partitioned to provide an unbiased assessment of model performance. By training on one subset and testing on another, it was estimated how well the model would achieve on unseen data. In this study, 80% data was used for training and 20% for testing using the $\text{train} - \text{test} - \text{split}$ method.

Model Training

Random Forest Regressor (RFR)

RFR is an ensemble technique which is a collection of tree predictors (Segal, 2004). It constructs various decision trees through training and generates the average forecast of these decision trees.

Let RFR be indicated as R_{fr} containing D decision trees, where $D = 100$ (No. of estimators). Mathematically, an input of $\hat{b}$ prediction is the

average of prediction through all particular d_i decision trees. See equation (1)

$$\hat{b} = \frac{1}{D}\sum_{i=1}^{D} d_i(a) \quad (1)$$

The training process includes building every one of the D decision trees. Every d_i the tree was constructed utilizing the bootstrap sample coming out of the training set S_{train}. Let the training set contain k samples $(A, b) = \{(a_1, b_1), (a_2, b_2), \ldots, (a_k, b_k)\}$, where A is the features (age, experience, education, SC, ASL, ATL, WB, SB) and b is the target variable, namely moral competence (MC).

Every d_i tree performed. Bootstrap sample $S_{bootstrap-i}$ was extracted from S_{train}. The tree d_i was produced by recursively dividing the data based on features using MSE to decide the optimal node at every node. At every node, the divide was decided by decreasing the square error's sum. See equation (2)

$$\text{MSE} = \frac{1}{k}\sum_{i=1}^{k}(b_i - \hat{b}_i)\text{^}2 \quad (2)$$

When the RFR model was trained, the prediction was produced at the test data S_{test}, for a sample of test a_j, the average prediction of overall decision trees through equation (3)

$$\hat{b_j} = \frac{1}{D}\sum_{i=1}^{D} d_i(a_j) \quad (3)$$

Gradient Boosting Regressor (GBR)

Gradient boosting is a learning technique that constructs a series of trees, each trying to correct the faults of its predecessors. GBR is an integrated model with higher performance and better stability (Li, Li, & Xu, 2018).

Let GBR be indicated as $_{br}$, which joined many decision trees d_i to make the final forecasting. Sample predictions are calculated as a weighted sum of the predictions from all the trees. A $\hat{b}_0$ constant value was predicted by the initial model, which is the b target variable mean. See equation (4)

$$\hat{b}_0 = \frac{1}{k}\sum_{i=1}^{k} b_i \quad (4)$$

At every m step, residuals were computed as with the difference between the actual b target and the present prediction of the model. $\hat{b}^{(m-1)}$. See equation (5)

$$\text{residuals}_{i}^{(m)} = b_i - \hat{b}_i^{(m-1)} \quad (5)$$

Utilizing the training set $S_{train} = \{(A, r^m)\}$, a d_m the decision tree was accoutred to the r^m residuals. The negative gradient was predicted by decision trees in the order in which the algorithm should be corrected to minimize loss.

We updated the GBR model predictions by adding part of the new tree prediction to the existing prediction. See equation (Artile6) (Intersoft Consulting, 2016).

$$\hat{b}_i^{(m)} = \hat{b}_i^{(m-1)} + \Delta d_m a_i \text{ (Artile6) } \Delta \text{ (learning rate)} \quad (6)$$

When the GBR model was trained, the prediction was produced at test data S_{test}, for a sample of test a_j. The sum of all trees forecasting is the prediction, which is weighted through the learning rate. See equation (7)

$$\hat{b}_j = \hat{b}_0 + \sum_{m=1}^{D} \Delta d_m a_i \quad (7)$$

Model Evaluation

MSE (Mean Square Error)

MSE was calculated using the mean of the absolute value of the errors, showing the deviation from true probability (Otchere et al., 2022), using equation (8).

$$\text{MSE} = \frac{1}{k_{test}} \sum_{j=1}^{k_{test}} (b_j - \hat{b}_j)\text{^}2 \quad (8)$$

R^2 Score

R-Square (R^2) checks how well a model predicts the independent variable of the observed dependent variable using equation (9).

$$\text{R(squared)} = 1 - \frac{\sum_{j=1}^{k_{test}} (b_j - \hat{b}_j)\text{^}2}{\sum_{j=1}^{k_{test}} (b_j - \hat{b}_j)\text{^}2} \quad (9)$$

Results

Rotated Component Matrix (Hermes et al.)

Factor loadings can be described as the coefficients of factor analysis that determine the relationship between observed variables and potentially underlying factors (Tavakol & Wetzel, 2020). The recommended standards for factor loadings are greater than or equal to 0.50 (Hulland, 1999; Truong & McColl, 2011).

Table 3

Rotated Component Matrix

	1	2	3	4	5	6
ASL1			.880			
ASL2			.871			
ASL3			.855			
ASL4			.848			
ASL5			.852			
ATL1				.884		
ATL2				.873		
ATL3				.829		
ATL4				.899		
ATL5				.803		
MC1		.858				
MC2		.883				
MC3		.850				
MC4		.851				
MC5		.806				
MC6		.844				
SC1						.817
SC2						.817
SC3						.822
SC4						.760
WB1					.928	
WB2					.855	
WB3					.919	
WB4					.895	
SB1	.872					
SB2	.896					

	1	2	3	4	5	6
SB3	.922					
SB4	.896					
SB5	.841					
SB6	.857					
SB7	.888					
SB8	.823					

Note. WB= Workplace Buoyancy, SB= Somatic Burden, ASL= Autonomy Supportive Leadership, ATL=Autonomy Thwarting Leadership, MC=Moral Competence, SC= Spiritual Climate.

RCM values given above display the factor loadings of variables and their respective items in the current study. The factors of SB are highly loaded with significant values of 0.823 to 0.922, indicating a strong correlation. The loadings of MC range from 0.806 to 0.883, thus remain significant. ASL values confirm a very high positive correlation with loadings ranging from 0.848 to 0.880. The WB factors loadings range from 0.855 to 0.928, which demonstrates it as a stable and measurable factor. ATL with loadings of 0.803 to 0.899 is also suitable. Finally, the loadings of SC range between 0.760 and 0.822, thus remain significant. These loadings suggest that each set of items efficiently captures the intended construct, supporting factor validity.

Construct Validity

Table 4 illustrates different measures of reliability and validity of the constructs in this study. Cronbach's alpha and composite reliability for all constructs range from 0.912 to 0.977, signifying internal consistency. AVEs, which are indicative of the proportion of variance supported by the construct, are compared to the measurement errors (Hair et al., 2021). The table shows that the discriminant validity of the constructs is also supported by the lower MSV values, as compared to AVE values. Moreover, MaxR(H) values are also high which depicts that the constructs under consideration are also internally consistent or reliable. The coefficient with asterisks between the brackets reveals meaningful associations while maintaining discriminant validity; for instance, SB with MC (0.452***) and ASL with SC (0.441***). These metrics attest to the suitability of the measurement instruments deployed in the study, affirming construct reliability.

Table 4

Construct Validity

	CR	AVE	MSV	MaxR(H)	SB	MC	ASL	ATL	WB	SC
SB	0.98	0.84	0.31	0.98	0.92					
MC	0.96	0.79	0.36	0.96	0.45***	0.89				
ASL	0.97	0.88	0.31	0.99	0.56***	0.49***	0.94			
ATL	0.91	0.68	0.15	0.98	0.20***	0.11*	0.24***	0.82		
WB	0.94	0.81	0.15	0.97	0.12*	0.04	0.02	0.38***	0.90	
SC	0.91	0.73	0.36	0.92	0.43***	0.60***	0.44***	0.22***	0.14*	0.85

Note. WB= Workplace Buoyancy, SB= Somatic Burden, ASL= Autonomy Supportive Leadership, ATL=Autonomy Thwarting Leadership, MC=Moral Competence, SC= Spiritual Climate.

SEM

Table 5 shows the direct effect of ASL, ATL, WB, and SB on MC. The hypotheses are accepted at a significant level of $p < 0.05$. It was found that ASL has a significant impact on MC with a *p*-value of 0.005. However, the impact of ATL, WB, and SB remains insignificant on MC, as determined by their respective *p*-values of 0.480, 0.660, and 0.060.

Table 5

Direct Hypotheses

Parameter			Estimate	Lower	Upper	*p*
MC	<---	ASL	.211	.079	.342	.005
MC	<---	ATL	-.040	-.136	.057	.480
MC	<---	WB	-.022	-.094	.060	.660
MC	<---	SB	.153	.017	.278	.060

Note. WB= Workplace Buoyancy, SB= Somatic Burden, ASL= Autonomy Supportive Leadership, ATL=Autonomy Thwarting Leadership, MC=Moral Competence, SC= Spiritual Climate.

Table 6 presents the results of the mediation of SC. The mediation of SC is accepted and remains significant between ASL and MC ($p = 0.001$), ATL and MC ($p = 0.040$), and SB and MC ($p = 0.001$). However, the mediation of SC was found to be insignificant in the association between WB and MC ($p = 0.470$).

Table 6

Indirect Hypotheses

Indirect Path	Unstandardized Estimate	Lower	Upper	*p*	Standardized Estimate
ASL --> SC --> MC	0.096	0.045	0.157	0.001	0.100***
ATL --> SC --> MC	0.049	0.009	0.102	0.040	0.046*
WB --> SC --> MC	0.015	-0.020	0.060	0.470	0.016
SB --> SC --> MC	0.098	0.052	0.158	0.001	0.108***

Note. WB= Workplace Buoyancy, SB= Somatic Burden, ASL= Autonomy Supportive Leadership, ATL=Autonomy Thwarting Leadership, MC=Moral Competence, SC= Spiritual Climate.

Random Forest Regression and Gradient Boosting Regression

The analysis focused on comparing the performance of Random Forest Regression (RFR) and Gradient Boosting Regression (GBR) models using Mean Squared Error (MSE) and R-squared (R^2) metrics.

Figure 4

RFR and GBR with Respect to MSE and R^2

```
Random Forest Mean Squared Error: 0.5719656093457728
Random Forest R^2 Score: 0.4894067742853345

Gradient Boosting Mean Squared Error: 0.5887145176856872
Gradient Boosting R^2 Score: 0.47445503768309727
```

The Random Forest Regression (RFR) model achieved a mean squared error (MSE) of 0.572 and an R-squared (R^2) value of 0.489. These evaluation metrics showed that RFR explains a 48.9% variance in MC (the target variable). The RFR model accounts for almost half of the relationship within the data and underlying patterns. The lower MSE=0.572 indicates that the forecasts are, on average, closer to true values than the GBR model. A lower MSE value means a smaller prediction error, making the RFR model more accurate in this scenario.

Table 7
Comparison between RFR and GBR

	MSE	R^2
RFR	0.572	0.489
GBR	0.589	0.474

The results revealed that both models achieved reasonably accurate predictions, with RFR slightly outperforming GBR. The RFR model achieved an MSE value of 0.572 and an R^2 value of 0.489, explaining 48.9% of the variance in the target variable (moral competence). In comparison, the GBR model achieved an MSE value of 0.589 and an R2 value of 0.474, explaining 47.4% of the variance. RFR consistently outperformed the other models (El Mrabet et al., 2022). Its greatest strength is its ability to discover meaningful interactions and non-linear effects of the predictors (Rigatti, 2017). In terms of MSE and R^2 values, the RFR model performed slightly better than GBR. The improved performance of RFR can be attributed to its capability to minimize variance by clustering many decision trees. By averaging the results of multiple independent trees, it generalizes correctly to unseen data and reduces overfitting. Furthermore, since it is inherently fit for noise and aberration, it can perform better when the data is complex or noisy.

Alternatively, GBR creates trees sequentially, with each new tree trying to correct the errors of the previous tree. This sequential learning step sometimes results in a slightly higher error of prediction when the model gets stuck in a local minimum or overfits regularization techniques. However, GBR may be better than the polynomial and SVR regression models (Elango et al., 2022), although it underperformed slightly as compared to RFR in this study.

Figure 5

Differences in MSE and R2 for (RFR and GBR) Models

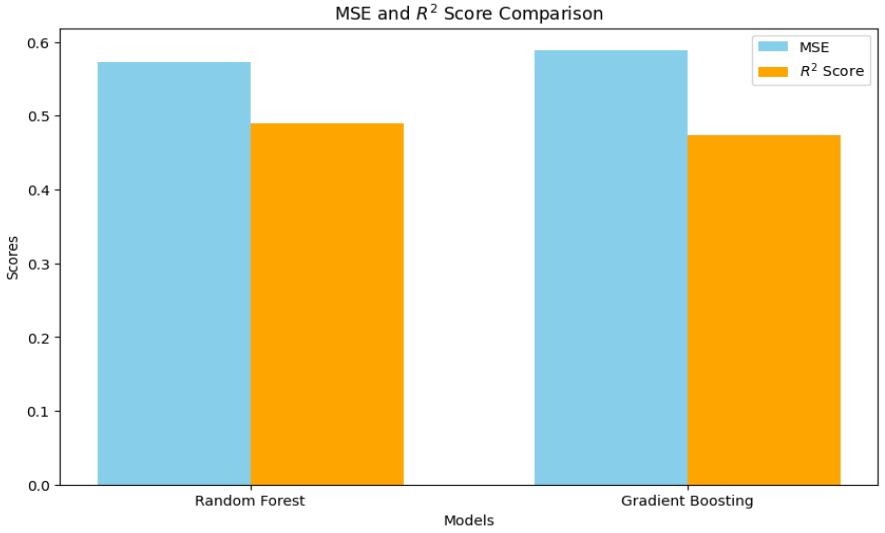


Figure 6

Predicted and Actual Values for (RFR and GBR) Models

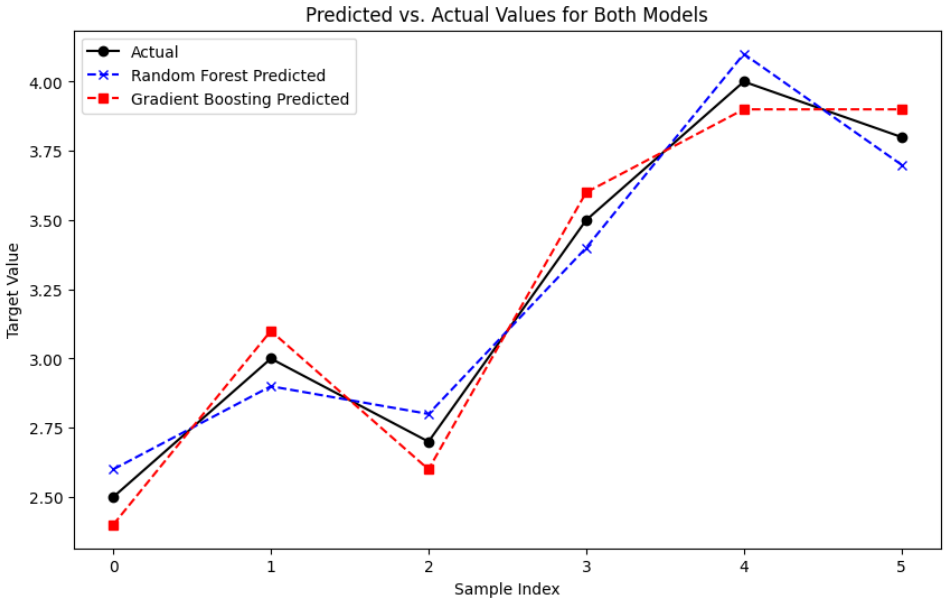
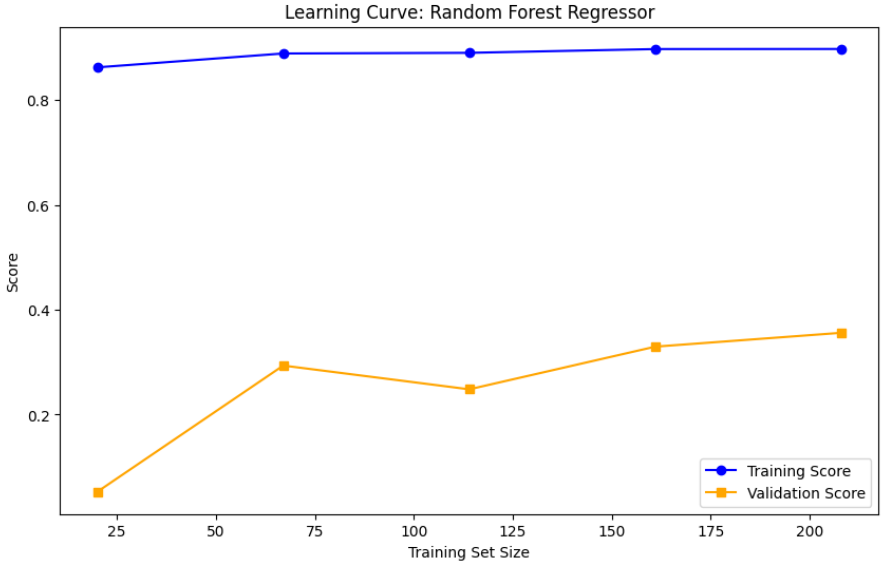


Figure 7

Learning Curve of the Recommended RFR Model



Discussion

The current study aimed to examine the relationship between the selected variables. The study compared two machine learning models, namely RFR and GBR, to analyse the factors that predict moral competence in educational contexts. In general, the results extend the autonomy-supportive leadership theory and practice, particular workplace settings, and the interactions between the elements of the workplace and educators' moral competence, calling for supportive organizational climates for education professionals. The current investigation revealed the following important findings that are consistent with and complement previous research on workplace antecedents and moral reasoning. Firstly, the direct effect of ASL on MC was proved to be significant, while the direct effect of ATL, WB, and SB on MC was not found to be significant. Moreover, inspecting the direct effects of mediation by SC showed that SC is particularly important in mediating the effects of ASL, ATL, and SB on MC. However, the interaction between WB and MC in relation to SC was not evident, indicating that WB seems not to affect teachers' moral development, directly (Collie, 2021; Liu, Duan, & Chu, 2022). It was discovered that the autonomy-supporting process of management enhances MC, as it promotes

intrinsic ethical theories (Chmeit, 2024). The findings support this view, whereby ASL was found to be positively associated with MC and SC was identified as a mediator. If teachers' leaders are autonomy-supportive, such perceptions enhance their value and efficacy as well as their moral decision-making and ethicality (Kesler, 2020).

The insignificant relationship between ATL and MC implies that autonomy-thwarting leadership does not necessarily underpin moral competence. This finding is contrary to the current literature which recommends that most authoritative leadership behaviours constrain ethical conduct (Murtagh & Dawes, 2023; Zheng et al., 2021). When SC was introduced as a mediating variable, the relationship between ATL and MC remained statistically insignificant. This indicates that autonomy-thwarting leadership does not directly or indirectly impact teachers' moral competence within the studied context. In other words, even with a strong spiritual climate, the negative effects of autonomy-thwarting leadership do not significantly alter moral competence. This suggests that other workplace factors may play a more critical role in shaping teachers' ethical decision-making and moral development (Kumar & Dhiman, 2020). In such an environment, teachers may feel constrained and ethically undesirable, leading to a deterioration in their ethical decision-making (Ibrahim & Alhabbash, 2022). Furthermore, WB indicates one's ability to handle work-related stress and is a major conduit for the encouragement of ethical practices at work (Brewer et al., 2024). Subsequent research is required to explicate detailed connections between WB and MC in the school environment. Hence, it can be concluded that when the focus remains on spiritual values and when effective climates are fostered, the somatic burden is easier for teachers to bear and their moral integrity remains intact. Whereas, in unfavourable or ethically unaccommodating organizational environments, it can result in moral stress and unethical behaviours. The results agree with other extant works on workplace stress and outcomes referencing the ethical/moral standard (Jansen et al., 2020).

The computation for MSE and R^2 values in the two machine learning models further indicated that RFR produced modestly better results than GBR in predicting MC. RFR gave better results with a low MSE value of 0.572 and the coefficient of determination (R^2) value of 0.489, as compared to GBR which yielded an MSE value of 0.589 and R^2 value of 0.474. From these results, it can be inferred that RFR performed marginally better in

terms of variance in MC and resulted in higher predictions. Thus, RFR can outperform other models since it can capture interactions as well as the non-linearity of the features. Like many other models of this type, RFR creates multiple decision trees and comes up with the average prediction over them, which also mitigates the cases of over-fitting and enhances the model's prediction capability (Arokiaprakash & Selvan, 2022; Zhang et al., 2021). Although GBR also demonstrated good accuracy, a learning model operating layer by layer and iteratively may lead to more prediction errors due to overfitting or sticking at the local minimum. This implies that RFR is a more suitable model for intricate outcomes, such as moral competence, as compared to the traditional regression analyses in complex learning environments where countless factors contribute to teachers' ethical behaviour.

Consequently, it is asserted that the insights into the ways leadership styles, work environment, and somatic burden impact the moral competence of teachers could be useful, with spiritual climate as a mediating variable. The findings also indicate that autonomy-supportive leadership enhances moral competence and is more beneficial when there is a positive spiritual environment. Even though workplace buoyancy was not found to relate significantly to moral competence, its contribution to boosting teachers' psychological capital and levels of well-being cannot be disregarded.

Machine learning approaches were found to be efficient, with RFR used for predicting moral competence, indicating that ongoing research is considering the application of advanced analytical techniques. It was found that leadership styles, climate, and moral competence are interconnected. By studying them, we can help the teachers in their educational settings and prepare them for their ethical responsibilities at the workplace.

Theoretical Implications

The current study contributes to the theory by exploring how workplace buoyancy, somatic burden, and autonomy-supportive and autonomy-thwarting leadership styles enhance or diminish teachers' moral competence. Such variables have either been examined in the past along with other variables or have been analysed in different settings (Murtagh & Dawes, 2023; Yikilmaz et al., 2024). The integration of these constructs in a single study shows that teachers' moral competence is not dependent on any one factor but is the function of several factors that coexist in the

workplace. The study also confirms the moderating effect of spiritual climate where teachers' moral competence is concerned as well as its relationship to workplace factors. This is particularly significant because it advances the study of workplace spirituality which determines how both buoyancy and leadership styles affect moral competence (Paul et al., 2020). The analysis suggests that autonomy-supportive leadership has a positive relationship with teachers' moral competence, more than autonomy-thwarting leadership. This differentiation furthers the theoretical conception of leadership because it posits that not all types of leadership are beneficial for developing moral competence (Newstead et al., 2021; Wang et al., 2021).

Moreover, the application of both RFR and GBR in this study supplements the theoretical approach directed at identifying how machine learning methods improve analysis relationship systems in organizational contexts (Okokpujie et al., 2024; Su et al., 2021). In comparing these models' performances, this study advances the theory about how the application of more complex techniques in data analysis can help uncover data trends that simple statistical analysis might fail to detect.

Managerial Implications

Some major implications for improved and effective moral competence of teachers in educational organizations can be drawn from the findings of the current study. This study established that autonomy-supportive leadership leads to an increased moral competence of teachers. This underlines the need to emulate the leadership behaviour that enhances the levels of teachers' professional autonomy, support, and enabling (Day, 2020; Hashim et al., 2023). Organizations that support the development of educators should focus on preparing leaders who foster independence at schools (Brauckmann et al., 2023). In this way, institutions can influence the moral competence of their teachers which adds to their effectiveness. On the other hand, autonomy-thwarting leadership was proven to have an inverse relationship with teachers' moral competence, which often leads to burnout (Chen et al., 2024). Therefore, educational institutions need to determine leadership behaviours which decrease autonomy and take appropriate actions to deal with them. Workplace buoyancy was determined as another factor that affects moral competence, although the current study revealed that it had a smaller impact. To increase the levels of buoyancy at the workplace, there ought to be a practice of acknowledgement and

appreciation of accomplishments, mobilization of support in areas of difficulty, and explicit cultivation of positive attitudes (Granziera et al., 2022). There is a need to support such structures which facilitate the provision of a healthy environment that assists teachers in maintaining their ethical standards and efficiency in their work.

This study also established that somatic burden influences teachers' moral competence. Hence, educational institutions should prioritize to minimize the somatic burden on teachers through wellness programs, stress management resources, and workload moderation (Collie, 2021; Ibrahim et al., 2021). It is possible to state that working with such factors can contribute to the preservation of teachers' health and, therefore, influence positively their moral competence and effectiveness in their profession. Leaders in educational institutions should foster ethical values (Dey et al., 2022). This could involve implementing values-based training, establishing respect and integrity, and ensuring proper implementation of institutional policies and standards. Furthermore, supports the incorporation of positive psychological interventions to help teachers to cope during times of difficulty and to help them maintain strong psychological health during either difficult or ordinary periods of teaching and learning in an education facility (Corpuz-Reyes & Cruz-Mones, 2024).

Limitations and Future Directions

Even though this study presents significant contributions regarding the role of workplace buoyancy, somatic burden, and autonomy-supportive and autonomy-thwarting leadership styles in the development of teachers' moral competence mediated through spiritual climate, it has some limitations as well. Firstly, this study is cross-sectional and, therefore, conclusions cannot be drawn regarding causality. The data was also cross-sectional which limited the analysis to temporal sequencing and causality (Imai et al., 2023). Hence, it is suggested that future studies should be conducted using the longitudinal research design that would hopefully offer more evidence about the pathways to causation and the dynamic nature of these variables. For instance, a longitudinal research design can examine the variations in workplace buoyancy, leadership behaviour, moral competence, and spiritual climate for an extended period. Secondly, this study was based on the data of teachers only. The results of such context-specific studies cannot be easily transported to other contexts, such as other professions or organizations (Bergmark, 2023). This is because various industries could

have different dynamics that define or influence the relationship between leadership styles, workplace buoyancy, somatic burden, and moral competence. It remains the task of future research to investigate these variables in different fields including business, health, and non-profit sectors to increase the validity of this research.

Further, no other variables which could act as moderators or mediators were incorporated in this study. For instance, it is suggested by Yikilmaz et al. (2024) that personality traits may be included in the research model to define how teachers apprehend and respond to workplace buoyancy and leadership styles. The inclusion of other variables may also offer more information about how leadership styles and workplace buoyancy contribute to moral competence. Further, this study drew its leadership factors while relying only on autonomy-supportive and autonomy-thwarting leadership styles. More studies could build on other types of leadership styles, such as transformational or transactional leadership styles, to determine the impact they have on relations within the workplace and, in particular, on teachers' productivity and stress levels.

Conflict of Interest

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

Data Availability Statement

The data associated with this study will be provided by the corresponding author upon request.

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