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Ethical Leadership, Employee Trust, and Organizational Commitment: A Multilevel-Aware Mediation Model and Simulation Study

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ABSTRACT

Ethical leadership is consistently associated with favourable employee attitudes, but the mechanisms that link it to employees' attachment to their organisation, and the methodological conditions under which those mechanisms can be estimated credibly, remain insufficiently specified. Integrating social learning and social exchange theory, this study proposes that employees' trust in their leader mediates the relationship between ethical leadership and affective organisational commitment. It also examines how measurement error, team-level clustering and unobserved confounding affect tests of this mediation. A 17-item instrument and a population model with a priori specified effects were defined. Survey data for 360 employees nested in 60 teams were generated by Monte Carlo simulation and analysed with partial least squares structural equation modelling (PLS-SEM), consistent PLS (PLSc), and case-level and team-level (cluster) bootstrapping. Four further experiments, comprising 1,000 to 10,000 replications each, examined parameter recovery across estimators, power as a function of the number of teams, sensitivity to an unobserved confounder, and the Type I error of the direct effect under clustering. The measurement model met conventional criteria (α = .89–.91, composite reliability = .91–.93, AVE = .64–.69, HTMT ≤ .62). Perceptions of ethical leadership showed substantial within-team agreement (ICC(1) = .26, ICC(2) = .68). Ethical leadership was positively related to trust in the leader (β = .561, $p < .001$), and trust to affective commitment (β = .245, $p < .001$). The indirect effect (β = .138, cluster-bootstrap 95 % CI [.069, .214]) accounted for 35 % of the total effect, indicating complementary partial mediation. Across replications, PLS-SEM and sum-score regression under-estimated the indirect effect by 22–24 %, whereas PLSc was unbiased. An unobserved confounder of trust and commitment (γ = .30) inflated the indirect effect by 39 % and reduced the direct effect by 37 %. Ignoring clustering raised the false-positive rate for a null direct effect from 5 % to as much as 28 %. Cluster-robust inference largely removed this inflation. The study clarifies the trust-based mechanism linking ethical leadership to commitment and provides evidence-based design guidance for testing it. The guidance covers the choice of estimator, the number of teams, multilevel inference and causal identification. Because the data are simulated, the estimates illustrate the model and the behaviour of the methods. They are not empirical evidence, and the model requires confirmation with field data.

Introduction

Corporate scandals, abuses of power and failures of integrity have made the ethical conduct of leaders a central concern for organisations, regulators and employees. Research on ethical leadership developed in response. Brown et al. (2005) define it as leadership that both demonstrates normatively appropriate conduct in the leader's own actions and relationships and promotes such conduct among followers through two-way communication, reinforcement and decision-making. Two decades of research and several meta-analyses have shown that ethical leadership is associated with a broad set of favourable employee outcomes, including job satisfaction, organisational commitment, citizenship behaviour, performance and reduced deviance (Bedi et al., 2016; Ng & Feldman, 2015).

Among these outcomes, affective organisational commitment, the employee's emotional attachment to, identification with and involvement in the organisation (Allen & Meyer, 1990; Meyer &

Allen, 1991), is of particular practical importance. Meta-analytic evidence links affective commitment to lower turnover, lower absenteeism, higher performance and greater citizenship behaviour (Mathieu & Zajac, 1990; Meyer et al., 2002). Understanding how leaders build commitment is therefore central to retaining talent and sustaining performance. Yet the mechanisms through which ethical leadership translates into commitment are less well established than the bivariate association. Trust in the leader is a prime candidate. Ethical leaders are honest, fair and principled, and these are precisely the attributes of integrity and benevolence on which trust is founded (Mayer et al., 1995). Trust, in turn, is one of the strongest correlates of commitment in the leadership literature (Dirks & Ferrin, 2002). Ng and Feldman (2015) identified trust in the leader as an important mediator in the nomological network of ethical leadership.

The relevance of this question has grown as organisations face higher voluntary turnover, more dispersed and hybrid forms of work, and greater public scrutiny of corporate conduct. In such settings, formal control systems cannot fully monitor behaviour, and organisations depend more heavily on employees' voluntary identification with organisational goals. Leaders are the most proximal representatives of the organisation for most employees, and their conduct shapes how employees interpret the organisation's values and intentions. If ethical leadership builds commitment primarily by earning employees' trust, then leadership development should focus on the behaviours that make leaders trustworthy, such as consistency, fairness, transparency and genuine concern. If, by contrast, ethical leadership operates mainly through other channels, such as value congruence or perceptions of organisational justice, different interventions would be indicated. Identifying the mechanism therefore has direct practical consequences.

Testing this mechanism credibly is, however, more difficult than it appears. Most studies of ethical leadership use cross-sectional employee surveys in which several subordinates rate the same leader. This design creates three methodological problems that are often overlooked. First, the constructs are measured with error, and composite-based estimators such as standard PLS-SEM or sum-score regression attenuate structural paths. Second, employees are nested in teams that share a leader, so their observations are not independent. Ignoring this clustering understates standard errors and inflates false-positive rates (Bliese & Hanges, 2004; Cameron & Miller, 2015). Third, mediation analysis rests on the assumption that the mediator–outcome relationship is not confounded (Imai et al., 2010). In leadership research this assumption is frequently violated by unmeasured variables such as leader–member exchange quality, dispositional affect or common method variance (Antonakis et al., 2010; Podsakoff et al., 2012). Each of these problems can change substantive conclusions about whether and how strongly trust mediates the effect of ethical leadership.

This paper addresses both the theoretical and the methodological gap. Theoretically, it integrates social learning theory (Bandura, 1986) and social exchange theory (Blau, 1964; Cropanzano & Mitchell, 2005) into a mediation model in which ethical leadership builds trust in the leader, which in turn fosters affective organisational commitment. Methodologically, it combines a fully specified analytical workflow on a simulated multilevel sample with four Monte Carlo experiments. These experiments quantify how much conventional estimators under-state the indirect effect, how many teams are needed to detect it, how sensitive it is to unobserved confounding, and how severely ignoring team clustering distorts inference about the direct effect.

The study makes three contributions. First, it specifies and justifies a parsimonious trust-based model of the ethical leadership–commitment relationship and derives four hypotheses. Second, it provides a measurement instrument and a transparent, reproducible analytical template, including multilevel diagnostics and cluster-robust inference, for field studies of the model. Third, it offers quantitative design guidance that is directly relevant to the large body of survey research on ethical leadership. The data analysed in this paper are simulated from a population model with known parameters, and the results are statements about the model and the methods. They are not empirical findings about real leaders or employees, and the paper is explicit throughout about this distinction.

2. Literature Review and Hypothesis Development

2.1 Ethical leadership

Ethical leadership has two pillars. As a 'moral person', the ethical leader is honest, trustworthy, fair and principled in decision-making and shows concern for people. As a 'moral manager', the leader actively promotes ethical conduct among followers by communicating about ethics, setting clear standards, and using rewards and discipline to hold followers accountable (Brown & Treviño, 2006; Treviño et al., 2000). The second pillar distinguishes ethical leadership from related constructs, such as transformational and authentic leadership, that share its emphasis on integrity but do not include the transactional, ethics-specific influence on followers (Brown et al., 2005). Subsequent work has developed multidimensional measures that distinguish fairness, integrity, ethical guidance, people orientation, power sharing and role clarification (Kalshoven et al., 2011). Other studies have shown that ethical leadership cascades from top management to supervisors and onward to employees (Mayer et al., 2009).

Ethical leadership is typically assessed by subordinates' ratings of their immediate supervisor. Because several subordinates rate the same leader, ethical leadership is partly a shared perception at the team level and partly an individual perception shaped by each employee's relationship with the leader (Den Hartog & De Hoogh, 2009). This levels-of-analysis issue has theoretical significance, because team-level and individual-level ethical leadership may operate through different mechanisms. It also has methodological significance, because it introduces non-independence into the data, as discussed in Section 2.6.

2.2 Trust in the leader

Trust is commonly defined as a psychological state in which a person is willing to accept vulnerability because of positive expectations about another party's intentions or behaviour (Rousseau et al., 1998). Mayer et al. (1995) proposed that trust is grounded in the trustor's perceptions of the trustee's ability, benevolence and integrity. McAllister (1995) distinguished cognition-based trust, which rests on evidence of reliability and competence, from affect-based trust, which rests on emotional bonds and reciprocal care. Trust in the direct leader is especially consequential for employees because the leader controls many of the resources, evaluations and decisions that affect them (Dirks & Ferrin, 2002). The meta-analysis by Dirks and Ferrin (2002) showed that trust in leadership is related to job performance, citizenship behaviour, job satisfaction and organisational commitment, with particularly strong associations for attitudinal outcomes.

2.3 Affective organisational commitment

Meyer and Allen's (1991) three-component model distinguishes affective commitment (wanting to stay), continuance commitment (needing to stay because of the costs of leaving) and normative commitment (feeling obliged to stay). Affective commitment has the strongest and most consistently favourable relationships with employee behaviour and well-being (Meyer et al., 2002). Its antecedents are mainly work experiences, especially those that convey that the organisation is supportive, fair and trustworthy, rather than personal characteristics or structural factors (Meyer et al., 2002). Because employees often view their immediate leader as an agent of the organisation, leader behaviour is a major source of such experiences. This study therefore focuses on affective commitment as the outcome most directly connected to the relational processes set in motion by ethical leadership.

2.4 Theoretical framework

Two theories explain why ethical leadership should influence trust and commitment. Social learning theory (Bandura, 1986) holds that people learn appropriate behaviour by observing credible and attractive role models. Ethical leaders are such models. Their visible fairness, honesty and principled decisions signal which behaviours are valued and how employees can expect to be treated (Brown et al., 2005). Observing consistent ethical conduct provides employees with evidence of the leader's integrity and benevolence, the very perceptions that ground trust (Mayer et al., 1995).

Social exchange theory (Blau, 1964; Cropanzano & Mitchell, 2005) explains how trust is converted into commitment. Social exchanges, unlike economic exchanges, involve unspecified obligations whose fulfilment cannot be enforced, so they depend on trust that the other party will

reciprocate. When leaders treat employees fairly and with care, employees perceive a high-quality exchange relationship and feel obliged to reciprocate with positive attitudes and behaviours (Walumbwa et al., 2011). Trust is both an outcome of such fair treatment and the condition that allows the relationship to deepen into emotional attachment. Because employees generalise their experience with the leader to the organisation the leader represents, trust in the leader should extend to attachment to the organisation (Neubert et al., 2009; Xu et al., 2016). Ethical leadership may also influence commitment directly, for instance by aligning employees' values with an organisation perceived as principled, or through mechanisms other than trust such as organisational identification and justice perceptions (Walumbwa et al., 2011; Xu et al., 2016).

2.5 Hypotheses

Ethical leaders create work experiences of fairness, respect and principled decision-making that foster employees' emotional attachment to the organisation (Brown & Treviño, 2006; Neubert et al., 2009). Meta-analytic evidence confirms a positive association between ethical leadership and organisational commitment (Bedi et al., 2016; Ng & Feldman, 2015).

H1. Ethical leadership is positively related to employees' affective organisational commitment.

By displaying integrity, fairness and concern for employees, ethical leaders provide direct evidence of the trustworthiness dimensions identified by Mayer et al. (1995). Through two-way communication they also reduce the uncertainty that otherwise makes accepting vulnerability risky (Brown et al., 2005).

H2. Ethical leadership is positively related to employees' trust in the leader.

Trust in the leader signals a high-quality social exchange and creates felt obligation and emotional bonds that extend to the organisation (Cropanzano & Mitchell, 2005; Dirks & Ferrin, 2002).

H3. Trust in the leader is positively related to affective organisational commitment.

Combining H2 and H3, trust is expected to transmit part of the effect of ethical leadership to commitment. Because ethical leadership may also operate through other mechanisms, partial mediation is expected (Ng & Feldman, 2015; Zhao et al., 2010).

H4. Trust in the leader mediates the positive relationship between ethical leadership and affective organisational commitment.

Figure 1 presents the research model.

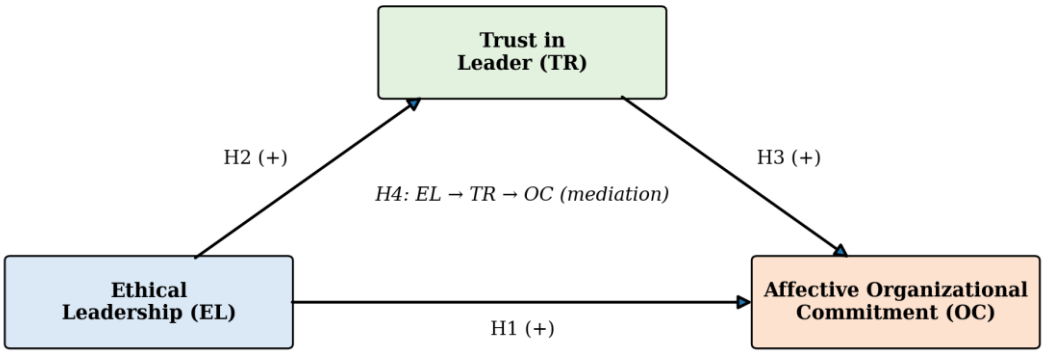

Figure 1. Research model and hypotheses.

2.6 Methodological challenges in testing the model

Three features of typical ethical-leadership studies threaten the validity of mediation tests. The first is measurement error. When latent constructs are represented by composites, as in standard PLS-SEM or sum-score regression, the paths into and out of the mediator are attenuated. Because the mediator is measured imperfectly, part of its effect is also misattributed to the independent variable (Dijkstra & Henseler, 2015). The second is clustering. Employees who share a leader provide correlated ratings, and

treating them as independent understates standard errors (Bliese & Hanges, 2004; Cameron & Miller, 2015). Multilevel mediation models have been developed to separate individual- and group-level effects (Krull & MacKinnon, 2001), but many applied studies still ignore the nesting. The third is confounding. Causal interpretation of the indirect effect requires that no unmeasured variable affects both mediator and outcome (Imai et al., 2010). Employees who are dispositionally positive, or who enjoy a particularly close relationship with their leader, may report both higher trust and higher commitment, irrespective of ethical leadership (Antonakis et al., 2010). Common method variance arising from single-source self-reports acts in a similar way (Podsakoff et al., 2003). The simulation experiments in this study quantify the consequences of each of these threats for the hypothesised model.

3. Methodology

3.1 Research design

The study uses a Monte Carlo simulation design structured according to the ADEMP framework (aims, data-generating mechanisms, estimands, methods and performance measures; Morris et al., 2019). Simulation serves two purposes. First, it demonstrates and documents, before field data are collected, the complete analytical workflow for testing the model, including multilevel diagnostics and cluster-robust inference. Second, because the population parameters are known, it allows the accuracy of different estimators and inference procedures to be evaluated under conditions that mirror typical ethical-leadership surveys: multi-item scales, five-point responses, several subordinates per leader and possible unmeasured confounding. The simulated data do not represent real employees. All results in Section 4 describe properties of the model and of the methods, not empirical evidence about any organisation.

3.2 Measurement instrument

Table 1 lists the 17 items, all rated on five-point Likert scales (1 = strongly disagree, 5 = strongly agree). Ethical leadership (EL, six items) was adapted from the Ethical Leadership Scale of Brown et al. (2005) and covers both the moral-person facet (honesty, fairness, trustworthiness, concern for employees) and the moral-manager facet (discussing ethics, defining success in ethical terms, disciplining unethical conduct). Trust in the leader (TR, five items) was adapted from Mayer and Davis (1999) and McAllister (1995) and captures perceived integrity, benevolence, reliability and willingness to be vulnerable. Affective organisational commitment (OC, six items) was adapted from Allen and Meyer (1990) and covers emotional attachment, belonging, personal meaning and identification. The original scale contains reverse-keyed items. For simplicity they are positively keyed here, but in field applications they should be retained to reduce acquiescence bias. All constructs are reflective. Items are presented in adapted wording. Researchers should use the validated original instruments, with permission where required, and pre-test them in their language and context.

Table 1. Measurement instrument (adapted wording)

Construct	Code	Item (5-point Likert scale)	Adapted from
Ethical leadership (EL)	EL1	My leader conducts his/her personal life in an ethical manner.	Brown et al. (2005)
	EL2	My leader listens to what employees have to say.	
	EL3	My leader makes fair and balanced decisions.	
	EL4	My leader can be trusted to do what he/she says.	
	EL5	My leader discusses business ethics and values with employees.	
	EL6	My leader holds employees accountable for unethical behaviour.	
Trust in leader (TR)	TR1	My leader acts with integrity in dealings with me.	Mayer & Davis (1999); McAllister (1995)

	TR2	My leader genuinely cares about my well-being.	
	TR3	I can rely on my leader to keep his/her commitments.	
	TR4	I would be comfortable letting my leader make decisions that affect me.	
	TR5	I feel free to share problems at work with my leader.	
Affective commitment (OC)	OC1	I feel emotionally attached to this organisation.	Allen & Meyer (1990)
	OC2	This organisation has great personal meaning for me.	
	OC3	I feel a strong sense of belonging to this organisation.	
	OC4	I feel that this organisation's problems are my own.	
	OC5	I would be happy to spend the rest of my career here.	
	OC6	I feel like 'part of the family' in this organisation.	

Note. Items are adapted, abbreviated paraphrases for illustration; field studies should use the validated original scales.

3.3 Data-generating model

The population model (Table 2) comprises J = 60 teams of m = 6 employees (n = 360). Ethical leadership was generated as a partly shared perception with intraclass correlation ICC = .30, so that 30 % of its variance lies between teams. Trust and commitment were generated from the structural equations $TR = a \cdot EL + \varepsilon_1$ and $OC = c' \cdot EL + b \cdot TR + \varepsilon_2$, with a = .55, b = .35 and $c' = .20$, standardised latent variances, and residuals containing a team component (ICC = .10). The implied population indirect effect is $a \times b = .1925$ and the total effect is .39. These values represent the strong ethical leadership–trust association and moderate trust–commitment association suggested by the meta-analytic literature (Dirks & Ferrin, 2002; Ng & Feldman, 2015). They were fixed before any data were generated. Items were generated as $\lambda \cdot \eta + e$, with standardised loadings between .70 and .84, and were discretised into five ordered categories. A fixed random seed makes the dataset reproducible.

Table 2. Population (data-generating) model and simulation design

Element	**Specification**
Structure	60 teams × 6 employees (n = 360); one leader per team
Structural paths	EL → TR: a = .55; TR → OC: b = .35; EL → OC: $c' = .20$
Implied effects	Indirect $a \times b = .1925$; total = .39; population $R^2(TR) = .30$
Clustering	ICC(EL) = .30; ICC of structural residuals = .10
Indicator loadings	EL: .80, .78, .83, .76, .81, .74; TR: .84, .80, .78, .82, .75; OC: .79, .82, .76, .80, .72, .70
Main sample	Fixed seed; 5,000 case and 5,000 team (cluster) bootstrap resamples
Experiment 1	1,000 replications; sum-score regression vs. PLS-SEM vs. PLSc
Experiment 2	J = 10–80 teams × 2 effect scenarios × 400 replications; cluster-robust Monte Carlo CI
Experiment 3	Unobserved confounder $\gamma = 0, .10, .20, .30$ × 500 replications
Experiment 4	$c' = 0$; ICC = 0–.50; 60 × 6 and 30 × 12 designs × 1,000 replications; latent and PLS scores

3.4 Analytical strategy

The model was estimated with PLS-SEM (path-weighting scheme, Mode A; Hair et al., 2019) and with consistent PLS (PLSc), which corrects composite correlations for measurement error using the reliability coefficient ρA (Dijkstra & Henseler, 2015). The measurement model was assessed through loadings (≥ .708), Cronbach's α, ρA and composite reliability ρC (.70–.95), the average variance extracted (AVE ≥ .50), the Fornell–Larcker criterion and the heterotrait–monotrait ratio (HTMT < .85; Fornell & Larcker, 1981; Henseler et al., 2015). Non-independence was diagnosed with ICC(1), the proportion of variance attributable to team membership, and ICC(2), the reliability of team means (Bliese & Hanges, 2004).

Structural paths were evaluated through VIF, R^2, f^2 (Cohen, 1988) and 5,000 bootstrap resamples (Efron & Tibshirani, 1993). Two resampling schemes were compared. The conventional scheme resamples employees, and the cluster scheme resamples whole teams, which preserves within-team dependence (Cameron & Miller, 2015). Mediation was assessed by the percentile confidence interval of the indirect effect a × b and classified following Zhao et al. (2010), Preacher and Hayes (2008) and Hayes (2022). The variance accounted for (VAF) was reported descriptively. All analyses were implemented from first principles in Python (NumPy).

3.5 Monte Carlo experiments

Four experiments were conducted. Experiment 1 (estimator comparison) generated 1,000 samples from the population model and compared three estimators of a, b, c′ and a × b: sum-score regression (the PROCESS approach; Hayes, 2022), standard PLS-SEM and PLSc. Bias, standard deviation and root-mean-square error (RMSE) were recorded. Experiment 2 (power) varied the number of teams (J = 10, 20, 30, 40, 60, 80; m = 6) for the hypothesised model and for a weaker model (a = .25, b = .20, c′ = .10), with 400 replications per cell. Power was the proportion of 95 % Monte Carlo confidence intervals for the indirect effect that excluded zero (Preacher & Selig, 2012), computed with cluster-robust standard errors. Experiment 3 (confounding) added an unobserved variable U affecting both trust and commitment with strength $\gamma \in \{0, .10, .20, .30\}$, holding the causal paths constant, and recorded mean PLSc estimates over 500 replications. Experiment 4 (clustering) set the true direct effect to c′ = 0 and varied the ICC of ethical leadership and of the residuals (0, .10, .20, .30, .50) for two designs with the same total sample (60 teams × 6 and 30 teams × 12). For 1,000 replications per cell, it recorded the rejection rate of the null hypothesis c′ = 0 at α = .05 with conventional and cluster-robust (CR1) standard errors. This was done both for error-free latent scores, which isolates the effect of clustering, and for PLS composite scores, which adds the effect of measurement error.

3.6 Reporting standards and transparency

To support replication and comparison, the study follows current reporting recommendations for PLS-SEM (Hair et al., 2019) and for simulation studies (Morris et al., 2019). For the main sample, it reports item-level descriptive statistics, all measurement-model indicators, both resampling schemes and both estimators, so that readers can judge the robustness of each conclusion. For the experiments, it reports the number of replications, the performance measures (bias, standard deviation, RMSE, power and Type I error) and all simulation conditions. Monte Carlo error is small relative to the reported differences. With 1,000 replications, the standard error of a rejection rate near .05 is about .007, and with 400 replications the standard error of a power estimate near .80 is .02. Population values, random seeds and design factors are fully documented (Table 2), so that the results can be reproduced exactly and extended to other parameter values.

4. Results

4.1 Measurement model and multilevel diagnostics

Table 3 presents the measurement model. All 17 loadings exceeded .708 (range .722–.864). Cronbach's α ranged from .885 to .907, ρA from .887 to .909 and ρC from .914 to .928. The AVE values (EL = .684, TR = .685, OC = .639) supported convergent validity. Table 4 shows that the square root of each construct's AVE exceeded its correlations with the other constructs, and that all HTMT ratios were below .85, the highest being .624 for EL–TR. Discriminant validity was therefore established. The first unrotated factor explained 42.2 % of the item variance.

Table 3. Measurement model: item statistics, loadings, reliability and convergent validity

Construct	Item	Mean	SD	Loading	α	ρA	ρC	AVE
Ethical leadership	EL1	3.32	1.08	0.852	0.907	0.909	0.928	0.684
	EL2	3.26	1.08	0.838				
	EL3	3.17	1.06	0.855				
	EL4	3.35	1.06	0.793				
	EL5	3.25	1.08	0.829				
	EL6	3.21	1.05	0.792				
Trust in leader	TR1	3.23	1.06	0.864	0.885	0.887	0.916	0.685
	TR2	3.17	1.03	0.812				
	TR3	3.11	1.08	0.821				
	TR4	3.27	1.07	0.845				
	TR5	3.21	1.04	0.796				
Affective commitment	OC1	3.28	1.06	0.801	0.887	0.905	0.914	0.639
	OC2	3.20	1.04	0.858				
	OC3	3.07	1.05	0.788				
	OC4	3.31	0.99	0.823				
	OC5	3.21	1.08	0.798				
	OC6	3.01	1.05	0.722				

Note. Simulated data, n = 360 employees in 60 teams. α = Cronbach's alpha; ρA = Dijkstra–Henseler reliability; ρC = composite reliability; AVE = average variance extracted.

Table 4. Discriminant validity (Fornell–Larcker below the diagonal, HTMT above) and multilevel diagnostics

Construct	EL	TR	OC	ICC(1)	ICC(2)
Ethical leadership (EL)	**0.827**	0.624	0.430	0.261	0.679
Trust in leader (TR)	0.561	**0.828**	0.421	0.178	0.565
Affective commitment (OC)	0.392	0.388	**0.800**	0.221	0.629

Note. Bold diagonal values are square roots of AVE. ICC(1) = proportion of variance between teams; ICC(2) = reliability of team means (construct scores).

The multilevel diagnostics confirmed non-independence. Ethical leadership had ICC(1) = .261 and ICC(2) = .679 ($F(59, 300) = 3.12$), so roughly a quarter of the variance in ethical-leadership perceptions lay between teams, and team means were moderately reliable. Trust (ICC(1) = .178) and commitment (ICC(1) = .221) were also clustered, partly because they inherit the shared component of ethical leadership. These values are within the range typically observed for leadership perceptions and imply that inference procedures assuming independent observations are not strictly appropriate.

4.2 Structural model and hypothesis testing

The inner VIF was 1.46, indicating no collinearity concern. Table 5 and Figure 2 present the structural results with both resampling schemes. Ethical leadership was strongly related to trust in the leader ($\beta = .561$, conventional SE = .036, cluster SE = .041, $p < .001$, cluster 95 % CI [.481, .639]; $f^2 = .460$), supporting H2. Trust was positively related to affective commitment ($\beta = .245$, cluster SE = .061, $p < .001$, CI [.125, .366]; $f^2 = .051$), supporting H3. Ethical leadership also had a positive direct effect on commitment ($\beta = .254$, cluster SE = .054, $p < .001$, CI [.145, .362]; $f^2 = .055$), supporting H1. The model explained 31.5 % of the variance in trust and 19.5 % in commitment. With PLSc the values were 39.0 % and 23.0 %.

Table 5. Structural model results with conventional and team-level (cluster) bootstrapping (5,000 resamples each)

Hypothesis / path	β	SE (case)	SE (cluster)	p (cluster)	95 % CI (cluster)	f²	PLSc β	Decision
H1: EL → OC (direct)	0.254	0.059	0.054	< .001	[0.145, 0.362]	0.055	0.265	Supported
H2: EL → TR	0.561	0.036	0.041	< .001	[0.481, 0.639]	0.460	0.625	Supported
H3: TR → OC	0.245	0.060	0.061	< .001	[0.125, 0.366]	0.051	0.267	Supported
H4: EL → TR → OC (indirect)	0.138	0.036	0.037	< .001	[0.069, 0.214]	–	0.167	Supported
Total effect EL → OC	0.392	0.043	0.042	< .001	[0.309, 0.474]	–	0.432	–

Note. R²(TR) = 0.315; R²(OC) = 0.195 (PLSc: 0.390 and 0.230). VAF = 35.2 %. Case-bootstrap 95 % CI of the indirect effect: [0.071, 0.212].

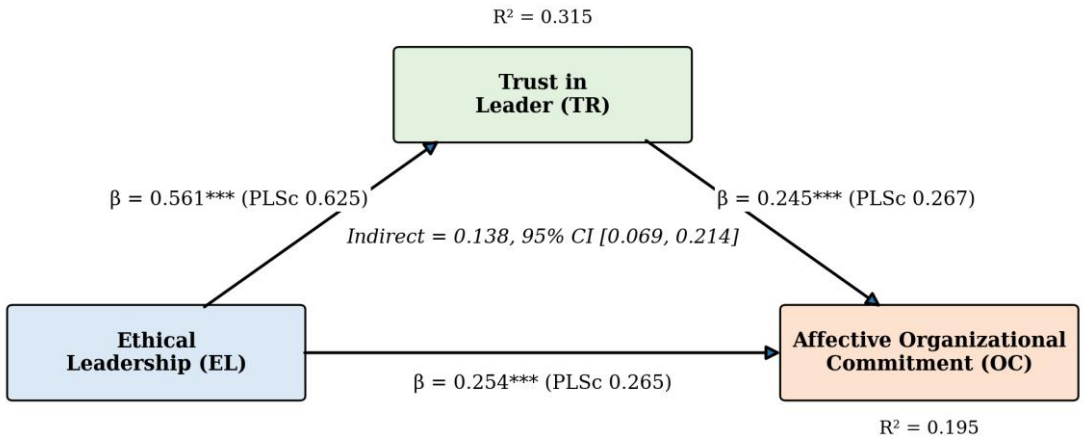

Figure 2. Estimated structural model (PLS-SEM; PLSc in parentheses; confidence interval from team-level bootstrap). ***p < .001.

The indirect effect of ethical leadership on commitment via trust was β = .138 (conventional SE = .036, cluster SE = .037). Its 95 % confidence interval excluded zero under both case resampling [.071, .212] and team resampling [.069, .214], supporting H4 (Figure 3). Together with the significant direct effect, this indicates complementary partial mediation (Zhao et al., 2010). The total effect was .392, of which 35.2 % was transmitted through trust (VAF). PLSc yielded a stronger first-stage path (.625) and a slightly larger indirect effect (.167, cluster CI [.072, .272]), while the direct effect (.265) remained significant. The substantive conclusions were therefore the same under both estimators and both resampling schemes. In this sample, the team-level clustering of the data had only modest consequences for the standard errors of the indirect effect. Experiment 4 shows that this is not generally true of the direct effect.

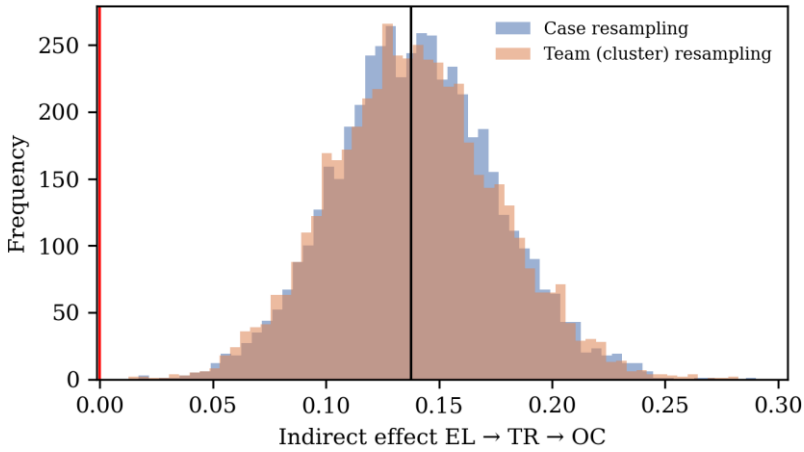

Figure 3. Bootstrap distributions of the indirect effect under case and team (cluster) resampling; black line = point estimate, red line = zero.

4.3 Estimator comparison (Experiment 1)

Table 6 and Figure 4 summarise 1,000 replications. Sum-score regression and standard PLS-SEM behaved almost identically. Both under-estimated the first-stage path a by 11–12 % (means .484 and .488 against .55) and the second-stage path b by 13 % (.303 and .306 against .35). The indirect effect was under-estimated by 22–24 % (.147 and .150 against .1925). The direct effect was recovered almost without bias (.196 and .198 against .20), but for the wrong reason. Attenuation of the ethical leadership–commitment association was offset by the leakage of part of the mediator's effect into the direct path, a consequence of measuring trust with error. PLSc recovered all parameters with negligible bias (a = .553, b = .348, c′ = .201, a × b = .192). Its larger sampling variance was outweighed by the absence of bias, so it had the lowest RMSE for a (.046 against .075–.078) and for the indirect effect (.041 against .052–.054).

Table 6. Estimator comparison over 1,000 replications: mean (SD), relative bias and RMSE

Parameter	True	Sum-score mean (SD)	Bias %	RMSE	PLS mean (SD)	Bias %	RMSE	PLSc mean (SD)	Bias %	RMSE
a (EL → TR)	0.55	0.484 (0.043)	-11.9	0.078	0.488 (0.042)	-11.2	0.075	0.553 (0.046)	+0.5	0.046
b (TR → OC)	0.35	0.303 (0.053)	-13.5	0.071	0.306 (0.053)	-12.6	0.069	0.348 (0.066)	-0.6	0.066
c′ (EL → OC)	0.2	0.196 (0.054)	-1.9	0.055	0.198 (0.055)	-0.9	0.055	0.201 (0.068)	+0.5	0.068
a × b (indirect)	0.1925	0.147 (0.030)	-23.7	0.054	0.150 (0.030)	-22.3	0.052	0.192 (0.041)	-0.0	0.041

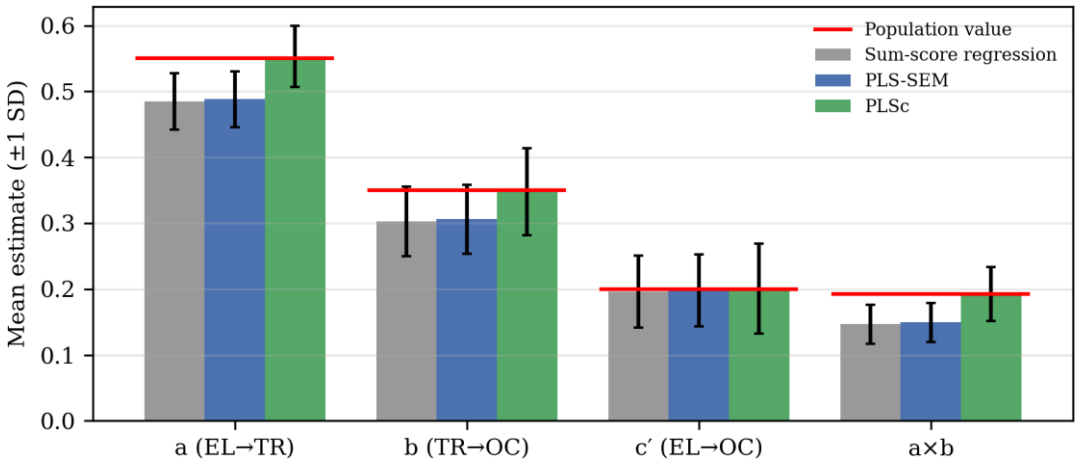

Figure 4. Mean estimates (±1 SD) of three estimators across 1,000 replications; red lines mark population values.

4.4 Power and the number of teams (Experiment 2)

Table 7 and Figure 5 report the power to detect the indirect effect with cluster-robust inference. For the hypothesised model, 10 teams (60 employees) gave power of .65, 20 teams (120 employees) .89 and 30 teams .98. For the weaker model, power was .25 with 10 teams, .45 with 20, .61 with 30 and .69 with 40, reaching .91 only with 60 teams (360 employees). About 50 teams of six would therefore be needed to reach the conventional 80 % threshold. This is consistent with the well-known finding that weak mediated effects require several hundred observations (Fritz & MacKinnon, 2007), here compounded by the attenuation of composite scores. Conventional and cluster-robust procedures gave similar power for the indirect effect (differences ≤ .04). The reason is that the a and b paths are dominated by within-team variation, whereas the clustering problem concerns mainly the direct effect, as Experiment 4 shows.

Table 7. Power to detect the indirect effect by number of teams (6 employees per team; cluster-robust Monte Carlo CI; 400 replications)

Scenario	J = 10 (n = 60)	J = 20 (n = 120)	J = 30 (n = 180)	J = 40 (n = 240)	J = 60 (n = 360)	J = 80 (n = 480)
Hypothesised (a = .55, b = .35, c′ = .20)	0.65	0.89	0.98	0.99	1.00	1.00
Weak (a = .25, b = .20, c′ = .10)	0.24	0.45	0.60	0.69	0.91	0.97

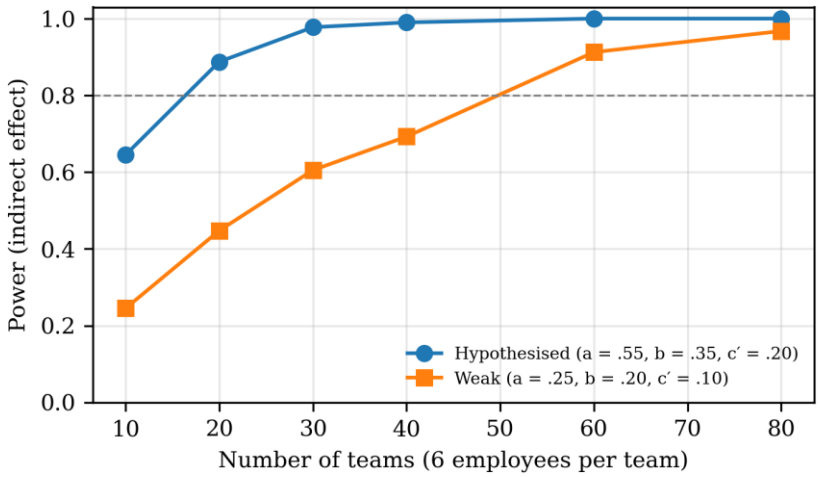

Figure 5. Power for the indirect effect as a function of the number of teams.

4.5 Unobserved confounding (Experiment 3)

Figure 6 shows the effect of an unobserved confounder of the trust–commitment relationship. Because U did not affect ethical leadership, the first-stage path remained unbiased (.546 in all conditions). The second-stage path, however, was inflated from .342 (γ = 0) to .358, .402 and .475 as γ increased to .10, .20 and .30. The indirect effect rose correspondingly from .187 to .196, .220 and .260, an increase of 39 % at γ = .30. At the same time, the direct effect fell from .205 to .196, .172 and .130 (−37 %). A confounder of moderate strength would therefore make the mediation appear stronger and more complete than it is, potentially turning a genuinely partial mediation into an apparently full one. This occurred even with the consistent estimator, because the problem is one of causal identification, not of measurement.

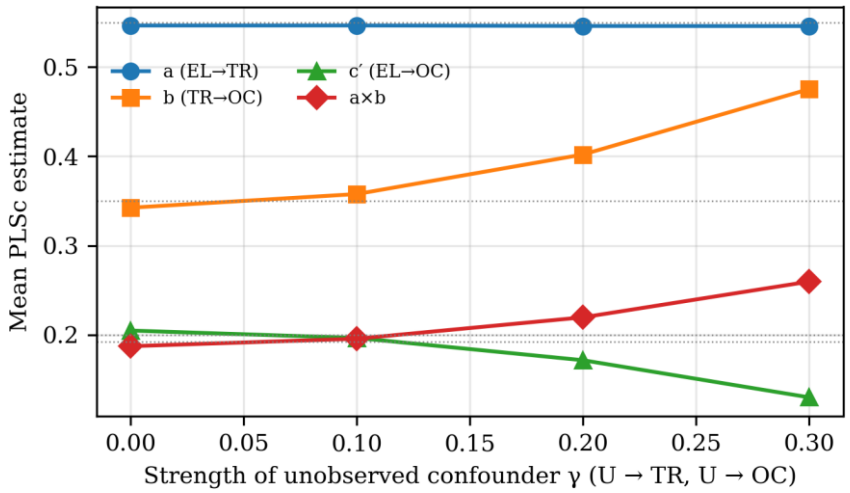

Figure 6. Mean PLSc estimates as a function of the strength of an unobserved confounder of trust and commitment (500 replications per condition); dotted lines mark population values.

4.6 Clustering and the direct effect (Experiment 4)

Figure 7 and Table 8 present the Type I error rates for the direct effect when its true value is zero. With error-free scores and no clustering, both procedures were close to the nominal 5 % (conventional .059 and .047; cluster-robust .060 and .063). As the ICC increased, the conventional rejection rate rose steeply, to .099 at ICC = .30 and .187 at ICC = .50 with 60 teams of six. With 30 teams of twelve, it rose to .142 and .280. The cluster-robust procedure remained between .054 and .083 in all conditions. Larger teams therefore aggravate the problem, because the design effect increases with cluster size.

With PLS composite scores, the false-positive rate exceeded the nominal level even without clustering (.092–.110). When trust is measured with error, part of its effect on commitment is attributed to ethical leadership. In the null condition, the mean PLS estimate of c′ was .030, whereas the PLSc estimate was .002. Cluster-robust standard errors corrected the clustering component (rates .084–.110) but not this measurement-error component. A spurious 'partial mediation' can therefore arise from two independent sources: unmodelled clustering and an unreliable mediator.

Table 8. Type I error rate for the direct effect (true c′ = 0; nominal α = .05; 1,000 replications per cell)

Scores	Teams × size	Standard errors	ICC = .00	ICC = .10	ICC = .20	ICC = .30	ICC = .50
Error-free scores	60 × 6	Conventional	0.059	0.054	0.070	0.099	0.187
	60 × 6	Cluster-robust	0.060	0.054	0.060	0.064	0.058
	30 × 12	Conventional	0.047	0.057	0.085	0.142	0.280
	30 × 12	Cluster-robust	0.063	0.057	0.059	0.071	0.083
PLS composite scores	60 × 6	Conventional	0.096	0.088	0.104	0.126	0.191

	60 × 6	Cluster-robust	0.103	0.094	0.093	0.100	0.086
	30 × 12	Conventional	0.092	0.085	0.115	0.169	0.265
	30 × 12	Cluster-robust	0.110	0.088	0.084	0.100	0.103

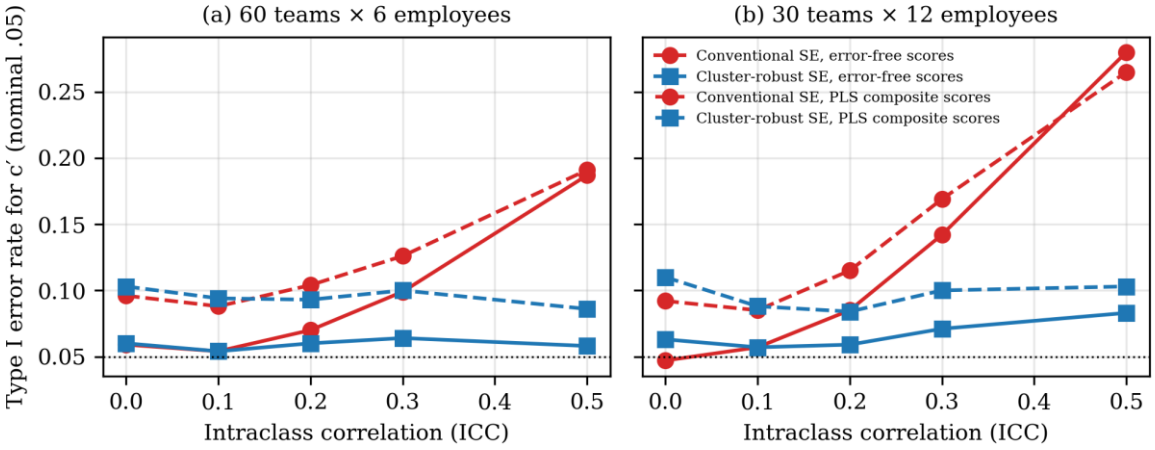

Figure 7. Type I error rate for the direct effect as a function of the intraclass correlation, for conventional and cluster-robust standard errors and for error-free and PLS composite scores.

5. Discussion

5.1 Theoretical implications

This study proposed that trust in the leader is a central mechanism through which ethical leadership fosters employees' affective commitment to the organisation, and it examined what is required to test this proposition credibly. Under the specified model, roughly one-third of the total effect of ethical leadership on commitment is transmitted through trust, and the remainder flows through other channels. Three theoretical implications follow.

First, the model clarifies how social learning and social exchange processes combine. Social learning theory explains why ethical conduct builds trust: employees observe a leader's fairness and integrity and infer that the leader will act in their interest (Bandura, 1986; Brown et al., 2005). Social exchange theory explains why trust becomes commitment: trust enables a relationship of unspecified, reciprocal obligations that employees generalise to the organisation the leader represents (Blau, 1964; Cropanzano & Mitchell, 2005). Specifying trust as the hinge between the two processes integrates perspectives that are often invoked separately in the ethical-leadership literature (Brown & Treviño, 2006; Ng & Feldman, 2015).

Second, the expectation of partial rather than full mediation carries theoretical content. A substantial direct path implies that ethical leadership influences commitment through additional mechanisms, for example by strengthening organisational identification, by shaping perceptions of organisational justice, or by signalling that the organisation's values are congruent with the employee's own (Walumbwa et al., 2011; Xu et al., 2016). Future models should therefore include parallel mediators. Experiments 3 and 4 also show that the apparent split between direct and indirect effects is fragile. Unmeasured confounding pushes estimates towards full mediation, whereas measurement error and unmodelled clustering push them towards spurious partial mediation. Claims about the completeness of mediation, common in the literature, should therefore be made cautiously.

Third, the analysis highlights the multilevel nature of ethical leadership. In the specified model a quarter of the variance in ethical-leadership perceptions lies between teams, which reflects the shared experience of a common leader. Ethical leadership is thus simultaneously a team-level climate-like property and an individual-level relational perception (Den Hartog & De Hoogh, 2009). The two levels may relate differently to trust and commitment. Team-level ethical leadership may shape commitment through shared norms, whereas individual-level deviations may operate through the personal exchange

relationship captured by trust. Multilevel mediation models that separate these components (Krull & MacKinnon, 2001) offer a direct way to test this proposition.

5.2 Methodological implications

The experiments yield five recommendations for empirical research on ethical leadership and related leadership constructs. (1) Composite-based estimates of mediated effects should be complemented with measurement-error-corrected estimates such as PLSc or covariance-based SEM. Sum-score regression and standard PLS-SEM under-estimated the indirect effect by more than a fifth under conditions typical of well-validated scales. (2) Studies should be planned in terms of the number of teams, not only the number of respondents. Twenty teams of six suffice for strong effects, but about fifty teams are needed when the paths are weak. (3) When several employees rate the same leader, ICC(1) and ICC(2) should be reported, and inference should use cluster-robust standard errors, team-level bootstrapping or multilevel models (Bliese & Hanges, 2004; Cameron & Miller, 2015). With an ICC of .30 and teams of twelve, conventional tests of the direct effect produced almost three times the nominal false-positive rate. (4) Because unmeasured confounding of the mediator–outcome relationship can inflate the indirect effect substantially, studies should measure plausible confounders such as leader–member exchange, positive affectivity and tenure with the leader, and should report sensitivity analyses (Imai et al., 2010). Designs that strengthen causal inference, including temporal separation, multi-source measurement and, where feasible, experimental manipulation of leader behaviour, should be preferred (Antonakis et al., 2010). (5) Procedural remedies for common method variance remain essential (Podsakoff et al., 2003, 2012). For example, ethical leadership could be measured from one set of team members and trust and commitment from another, which would break the shared-source link while exploiting the team structure.

5.3 Practical implications

For organisations, the model implies that ethical leadership is not only a matter of compliance but a means of building the trust on which employee attachment depends. Leadership development programmes can address both pillars of ethical leadership. The moral-person facet can be developed through consistent, transparent and fair decision-making, and the moral-manager facet through regular discussion of ethical issues, clear standards, and visible accountability for both good and bad conduct (Brown & Treviño, 2006; Treviño et al., 2000). Because trust is built through repeated observations of consistent behaviour, short-term interventions are unlikely to be sufficient. Organisations should instead embed ethical expectations in leader selection, performance evaluation and promotion.

HR managers should also recognise that trust is fragile. A single visible breach of integrity can undo the trust accumulated through many ethical acts, and the loss may then spill over into reduced commitment and higher turnover (Dirks & Ferrin, 2002; Meyer et al., 2002). Monitoring trust in leaders through regular, anonymous pulse surveys, analysed at the team level with appropriate multilevel methods, can provide early warning of relationships at risk. Finally, because ethical leadership cascades through organisational levels (Mayer et al., 2009), senior leaders' conduct sets the tone for supervisors, and investments in ethical leadership at the top are likely to be multiplied throughout the organisation.

5.4 Limitations and future research

The principal limitation is that the data are simulated. The population parameters were fixed a priori on the basis of the theoretical model and the general magnitude of relationships reported in meta-analyses. The study therefore cannot establish that trust mediates the effect of ethical leadership in any real organisation, or how large the effects are. Its contribution lies in specifying the model, demonstrating the analytical workflow and quantifying the performance of alternative methods. A field study is the necessary next step. It should use validated instruments, sample enough teams, collect data from multiple sources and at multiple time points, and apply multilevel or cluster-robust analysis.

Further limitations concern the simulation design. The data-generating model assumed linear relationships, normally distributed latent variables, equal team sizes and a single confounder. Real data may involve non-linearities, unequal and small teams, cross-level interactions and several correlated confounders. Trust was treated as a single construct, although cognition- and affect-based trust may play

different mediating roles (McAllister, 1995). Only affective commitment was modelled, and normative commitment, which is also plausibly influenced by ethical leaders, deserves attention. Finally, cultural context may moderate the relationships. Meta-analytic evidence indicates that the strength of ethical-leadership effects varies across regions and sectors (Bedi et al., 2016), so comparative studies across national and institutional settings would be valuable.

6. Conclusion

This study examined how ethical leadership may foster employees' affective commitment to their organisation and proposed trust in the leader as a central mediating mechanism grounded in social learning and social exchange theory. Using a 17-item instrument and simulated multilevel data for 360 employees in 60 teams, it demonstrated a complete analytical workflow, including measurement validation, multilevel diagnostics, PLS-SEM and consistent PLS estimation, and case- and cluster-level bootstrapping. Under the specified model, trust transmitted about one-third of the effect of ethical leadership on commitment (indirect effect .138, cluster 95 % CI [.069, .214]). Four Monte Carlo experiments showed that composite-based estimators under-state the indirect effect by more than a fifth, whereas consistent PLS recovers it accurately. About fifty teams are needed to detect weak mediated effects. Unobserved confounding of trust and commitment can inflate the indirect effect by almost 40 %. Ignoring the nesting of employees within teams can multiply the false-positive rate for the direct effect several-fold. These results provide a theoretically integrated model and practical methodological guidance for research on ethical leadership. For practice, the central message is that leaders who behave ethically earn their employees' trust, and that trust is a foundation of commitment. Testing this proposition with multi-source, multilevel field data is the essential next step.

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