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Managing External Accountability Through School Networks: Circuit-Level Collaborative Capacity, Internal Accountability Processes, and Teacher Professional Agency in Ghanaian Basic School Circuits

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Research Article

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Abstract

Background and Objective:

Performance-based accountability (PBA) systems create sustained external demands on schools; however, schools' capacity to translate those demands into coherent internal accountability processes and ultimately into teacher professional agency remains theoretically underspecified and empirically understudied in school network contexts. This study examines whether performance-based accountability pressure is associated with internal accountability processes and teacher professional agency, and whether circuit-level collaborative capacity, the quality of cross-school peer learning and professional support within Ghana's mandated circuit school networks, moderates the accountability–agency pathway across schools.

Method

Cross-sectional survey data were collected from 824 basic school teachers nested within 52 schools across 18 circuits in six regions of Ghana during the implementation of the 2019 Standards-Based Curriculum. A two-level multilevel structural equation model (MSEM) estimated in Mplus 8.10 using maximum likelihood with robust standard errors, simultaneously estimated within-level mediation, between-level direct effects, and a cross-level moderation hypothesis. Circuit collaborative capacity was operationalised as an aggregated school-level construct (r□□(□) = 0.77, ICC (1) = 0.16, ICC (2) = 0.71). Within-level indirect effects were estimated via model-constrained with 5,000 bootstrap samples.

Results

PBA pressure was positively associated with internal accountability processes (β = 0.43, p < .001; H1), which was substantially associated with teacher professional agency (β = 0.48, p < .001; H2). The indirect effect of PBA on agency via internal accountability was significant (indirect = 0.21, 95% CI [0.14, 0.29]; H3). At the between-school level, circuit collaborative capacity was positively associated with school-mean teacher professional agency (γ = 0.38, p < .001; H4). A cross-level interaction indicated that the PBA→internal accountability slope was significantly stronger in schools embedded in high-capacity circuits (γ = 0.26, p = .009; H5): the slope was 0.57 at high CCC versus 0.31 at low CCC, indicating that circuit collaborative capacity substantially amplifies schools' ability to convert external accountability pressure into coherent internal accountability (slope 0.57 at high CCC versus 0.31 at low CCC; 84% amplification of conversion efficiency). ICC = 0.23, indicating that 23% of agency variance was attributable to between-school differences.

Conclusions

The central finding is an accountability amplification process: the PBA–internal accountability association is 84% stronger in schools embedded in high-capacity circuits than in low-capacity circuits. This pattern is consistent with the interpretation that school networks – operationalised as Ghana's mandated circuit clusters – are not neutral conduits of external accountability demands but active structural conditions that shape how those demands are internalised. The findings are consistent with and extend Elmore's (2004) internal accountability thesis by showing that the strength of the accountability–agency pathway is associated with network-level collaborative conditions beyond individual school characteristics and provide the first MSEM evidence from Sub-Saharan Africa on how school network governance is associated with the external accountability–teacher agency relationship.

Introduction

The relationship between external accountability demands and the professional lives of teachers is one of the most contested questions in education policy research. A substantial body of scholarship documents how performance-based accountability (PBA) systems – characterised by standardised assessment data, school inspection regimes, and public performance reporting – reshape teachers' sense of professional purpose, constrain their instructional discretion, and generate compliance-oriented responses that may undermine rather than strengthen genuine professional practice (Ball, 2003; Verger & Skedsmo, 2021; Lingard et al., 2013). Yet, the conditions under which external accountability demands produce constructive rather than demoralising consequences for teachers remain poorly specified. Elmore's (2004) foundational argument that internal accountability must precede productive responsiveness to external pressure identifies the school as the critical mediating unit; however, it leaves open the question of what enables some schools to build strong internal accountability while others are overwhelmed by or merely comply with external demands.

This study argues that the answer lies at least partly at the level of school networks. Schools do not encounter external accountability demands in isolation; they are embedded in inter-school structures that either support or fail to support the collaborative capacity needed to translate accountability pressure into professional coherence. In Ghana, basic school circuits – mandated administrative clusters of 8–15 schools under a shared circuit supervisor – constitute precisely this kind of network structure. Circuit supervisors hold simultaneous accountability and professional development functions, creating a structural position through which external demands from the Ghana Education Service (GES) reach individual schools and through which cross-school peer learning and professional dialogue can be organised. The circuit level is Ghana's structural equivalent of the Multi-Academy Trust in England (Ehren & Godfrey, 2017), the networked improvement community in the United States (Bryk et al., 2015), or the professional learning network in the Asia-Pacific context (Daly, 2010) – a mandated inter-school network whose collaborative capacity varies substantially across its members. However, designating circuits as networks requires theoretical justification beyond administrative geography. Drawing on Daly's (2010) structural and relational criteria for educational networks, circuits qualify as genuine networks on three grounds. First, structural interdependence: circuit schools share a common accountability authority (the circuit supervisor), common performance reporting frameworks, and common resource allocation

channels, creating obligatory structural ties that do not exist between randomly co-located schools. Second, relational capacity: circuit supervisors hold an explicit mandate to organise professional learning across schools, creating the relational infrastructure through which inter-school professional ties can develop – or fail to develop – depending on supervisory practice. Third, network-internal accountability: the circuit is the primary unit through which GES district officers aggregate and communicate performance data to schools, meaning that accountability information flows through circuit-level channels before reaching individual schools. These three criteria distinguish circuits from mere administrative jurisdictions: they possess the relational infrastructure, shared accountability architecture, and designated leadership for collective action that characterise functional educational networks (Bryk et al., 2015; Ehren & Godfrey, 2017). Variation in circuit collaborative capacity therefore reflects whether this infrastructure is activated for professional learning and peer accountability or confined to compliance oversight – precisely the network governance distinction the collection's call identifies as consequential.

The present study addresses three interrelated gaps in the accountability literature. First, while the relationship between PBA and teacher responses has been extensively studied at the individual teacher level and the whole-school level, the network level – the collective capacity of inter-school structures to mediate external accountability demands – has received far less empirical attention, particularly using multilevel analytical methods that can simultaneously model within-school and between-school processes (Ehren & Godfrey, 2017; Verger & Skedsmo, 2021). Second, although internal accountability has been theorised and qualitatively elaborated (Abelmann & Elmore, 1999; Elmore, 2004), prior quantitative operationalisations have treated it as a unidimensional state- or district-level index: Carnoy and Loeb (2002), for example, coded accountability strength on a 0–4 scale across US states, collapsing the normative, structural, and data-use dimensions into a single composite. This study is, to the author's knowledge, the first to decompose internal accountability into three theoretically ordered sub-dimensions – normative coherence, structural coherence, and data use practices – measured at the individual teacher level within a multilevel model. This decomposition makes within-school variation in IAP theoretically tractable for the first time, enabling the mediation pathway to be estimated as a structural relationship within schools rather than as a cross-school or cross-system comparison. Third, the accountability literature is dominated by evidence from high-income, high-accountability-intensity contexts – England, Chile, Germany, the United States, and Scandinavia – with Sub-Saharan African contexts almost entirely absent, despite the extensive implementation of PBA elements (national assessments, GES inspections, performance-based district rankings) across the region (Nsengimana et al., 2024; Asante & Ntim, 2021).

Drawing on performance-based accountability theory (Carnoy & Loeb, 2002; Verger & Skedsmo, 2021), Elmore's (2004) internal accountability framework, distributed leadership and school networks scholarship (Spillane, 2006; Daly, 2010; Ehren & Godfrey, 2017), and ecological teacher professional agency theory (Priestley et al., 2015; Biesta et al., 2017), the study integrates these traditions through a single theoretical logic chain. PBA theory specifies the external signal: accountability systems create performance demands that schools cannot ignore. Elmore's framework specifies the productive

response pathway: schools convert those demands into professional improvement only when internal accountability is already coherent. Ecological agency theory explains why IAP enables TPA: in the ecological conceptualisation, teacher professional agency is not an individual attribute but an institutional achievement – it is realised in the interaction between teachers' agentic orientations and the institutional conditions that either scaffold or suppress those orientations. IAP is precisely that institutional condition: normative coherence, structural dialogue mechanisms, and collective data use provide the enabling infrastructure through which teachers' agentic capacities can be expressed rather than constrained. Network theory completes the model by specifying why some schools can build IAP under PBA pressure and others cannot: schools embedded in circuits with high collaborative capacity have access to the bridging social capital (Daly, 2010) through which accountability signals are collectively interpreted and improvement strategies are shared across school boundaries, making the construction of normative coherence and structural dialogue more achievable. This integration produces a three-level theoretical model: PBA creates the external accountability signal; IAP is the within-school institutional pathway through which that signal is converted into professional agency; and CCC is the network-level governance condition that amplifies the PBA→IAP conversion. The study proposes and tests this integrated model as a two-level MSEM in which: (a) PBA pressure is positively associated with internal accountability processes and, through them, with teacher professional agency; and (b) circuit-level collaborative capacity moderates the PBA–internal accountability slope across schools, such that schools embedded in high-capacity circuits more effectively convert external accountability pressure into coherent internal accountability and, ultimately, stronger teacher professional agency. The study was conducted with 824 teachers nested within 52 schools across 18 circuits in Ghana during the implementation of the 2019 Standards-Based Curriculum (SBC) – a reform that simultaneously elevated PBA pressure and varied the quality of circuit-level support available to schools.

The study makes three contributions to the collection's core questions, centred on an empirically observed pattern we term the accountability amplification process: circuit collaborative capacity amplifies the rate at which external accountability pressure is associated with internal accountability coherence within schools, over and above school-level governance conditions. This pattern advances existing theory in two ways. First, it extends Elmore's (2004) internal accountability thesis by adding a structural condition that the original framework did not contain: the network governance context within which schools build internal accountability. Elmore theorised that internal accountability must precede productive external responsiveness but left unspecified what determines whether schools can build internal accountability. The present study identifies circuit collaborative capacity as a network-level governance condition that systematically varies schools' capacity to do so, extending Elmore's school-level theory into a cross-level, network-embedded account. Second, it extends social capital and network accountability theory (Daly, 2010; Ehren & Godfrey, 2017) by specifying not merely that networks are associated with accountability outcomes but the conditional way in which they are associated, as amplifiers of the external-to-internal accountability conversion process, with the amplification operating through the bridging social capital mechanism that enriches the interpretive and relational conditions for internal accountability construction. The primary contribution is the empirical identification of an

accountability amplification process: the PBA→IAP association is 84% stronger in high-capacity circuits than in low-capacity circuits (slope 0.57 versus 0.31), a cross-level pattern consistent with the interpretation that circuit collaborative capacity amplifies schools' capacity to transform external accountability pressure into coherent internal accountability, directly addressing the collection's interest in how school networks build or fail to build internal accountability. Two supporting contributions contextualise this finding: first, by operationalising internal accountability as a three-dimensional measurable construct in a multilevel model, the study advances Elmore's (2004) framework from theoretical proposition to testable structural hypothesis; second, by locating the analysis in Ghana's mandated circuit school networks, the study extends network accountability research to a non-voluntary governance structure in Sub-Saharan Africa, examining whether amplification patterns are also observed across different network types and resource contexts.

Theoretical Framework and Hypothesis Development

Performance-Based Accountability and Internal Accountability Processes

Performance-based accountability (PBA) refers to accountability systems that use standardised measures of student performance to assign rewards or sanctions to schools and educators (Carnoy & Loeb, 2002; Verger & Skedsmo, 2021). In Ghana, PBA is enacted through a constellation of external accountability mechanisms: the Basic Education Certificate Examination (BECE) produces public school-level performance data; the Ghana Education Service conducts annual school inspections with explicit performance criteria; and district offices publish league-table-style school performance summaries that influence resource allocation and supervisory attention. These mechanisms constitute a genuine, if moderate-intensity, PBA regime that teachers and school leaders navigate daily.

The critical question is how schools respond to PBA pressure. Elmore's (2004) foundational distinction between external and internal accountability provides the theoretical anchor. External accountability consists of the demands, standards, and sanctions imposed on schools from outside – the GES inspection, the BECE result, and the district performance report. Internal accountability refers to the norms, expectations, and mutual professional obligations that teachers construct within the school, as Abelmann and Elmore (1999) describe as "clear and binding expectations among teachers, among students and teachers, and among principals and teachers" (p. 9) that define what quality teaching means and how professional effort is directed. Elmore's (2004) central thesis is that schools with weak internal accountability will produce superficial, fragmented, and compliance-oriented responses to external demands, while schools with strong internal accountability will respond productively, using external accountability signals as occasions for genuine professional improvement.

The present study operationalises internal accountability processes (IAP) as a three-dimensional construct encompassing normative coherence (shared professional values and expectations about

quality teaching), structural coherence (coordinated mechanisms for professional dialogue, lesson observation, and collective planning), and data use practices (how standardised assessment data is collectively interpreted and acted upon within the school). This operationalisation is consistent with Abelmann and Elmore's (1999) original framework and the empirical elaborations of Carnoy and Loeb (2002) and O'Day (2002). The three dimensions are theoretically ordered and interdependent: normative coherence constitutes the foundational layer – without shared professional values, dialogue and data use lack the evaluative standards needed to interpret what accountability signals mean for practice; structural coherence constitutes the operational layer – the organisational mechanisms through which shared norms are enacted in coordinated professional action; and data use practices constitute the accountability-responsive layer – the dimension most directly activated by external performance demands, through which accountability signals are collectively interpreted and responded to. Strong IAP is therefore not merely the co-occurrence of three separate professional practices but an integrated accountability response capacity: the degree to which a school's normative, structural, and data-interpretive resources function together to produce a coherent professional response to external demands (O'Day, 2002; Fullan, 2005). PBA pressure is expected to stimulate internal accountability processes: external demands create the motivational and structural incentives for schools to coordinate their professional responses.

H1

PBA pressure is positively associated with internal accountability processes within the school.

H2

Internal accountability processes are positively associated with teacher professional agency at the within-school level.

H3

The association between PBA pressure and teacher professional agency is partially mediated by internal accountability processes (PBA → IAP → TPA).

Teacher Professional Agency as the Outcome

Teacher professional agency refers to teachers' capacity to make purposeful professional choices about their instruction, curriculum interpretation, and professional development in the context of institutional constraints and demands (Priestley et al., 2015; Biesta et al., 2017). The ecological conceptualisation adopted here (Emirbayer & Mische, 1998; Priestley et al., 2015) treats agency not as a fixed individual attribute but as an achievement: an outcome of the interaction between teachers' professional dispositions and values, the relational and material resources available in their school context, and the iterative, projective, and practical-evaluative orientations they bring to their professional work. This framing is theoretically appropriate for the present study because it foregrounds the contextual

conditions – internal accountability coherence, circuit collaborative support – through which teacher agency is either enabled or constrained. Critically, the ecological conceptualisation provides the theoretical mechanism that links IAP to TPA: internal accountability processes constitute the institutional enabling condition for agency achievement. When schools have strong normative coherence, coordinated structural mechanisms, and collective data use practices, teachers have access to the shared professional standards, dialogue infrastructure, and interpretive frameworks they need to exercise purposeful professional judgement rather than reactive compliance. Emirbayer and Mische's (1998) iterative orientation specifically requires a past-anchored professional normative context – which is what normative coherence provides; their practical-evaluative orientation requires access to professional dialogue and feedback – which is what structural coherence provides; and their projective orientation requires interpretive resources for making sense of accountability signals as professional opportunities rather than threats – which is what data use practices provide. IAP is therefore not a correlate of TPA but its institutional precondition: the school-level governance structure through which agentic orientations are either expressed or suppressed.

PBA systems may threaten teacher professional agency by narrowing instructional discretion, intensifying compliance demands, and subordinating professional judgement to externally defined performance metrics (Ball, 2003; Mockler, 2011). However, when PBA demands are mediated through strong internal accountability – where teachers collectively define professional standards, engage in meaningful data use, and maintain shared normative expectations – the constraining effects of external demands may be redirected into professional coherence that sustains rather than erodes agency (Elmore, 2004; Hopmann, 2008). The internal accountability mediation pathway (H3) operationalises this theoretical proposition.

Circuit-Level Collaborative Capacity: The Network Moderator

The central question of the collection concerns how school networks build internal accountability in the face of external demands. This study addresses this question by introducing circuit collaborative capacity (CCC) as the key network-level moderator. CCC is defined as the degree to which schools within a circuit are engaged in substantive cross-school peer learning, supported by circuit supervisor-facilitated professional dialogue, collaborative problem-solving, and structured opportunities for school-to-school improvement exchange. This construct is conceptually grounded in the distributed leadership and social capital literatures (Spillane, 2006; Daly, 2010), Bryk et al.'s (2015) relational trust and collective capacity frameworks, and Ehren and Godfrey's (2017) analysis of how external accountability interacts with network-internal quality control mechanisms.

The theoretical mechanism through which CCC amplifies the IAP response can be specified using Daly's (2010) social capital framework. High-CCC circuits are characterised by abundant bridging social capital: professional ties that span individual school boundaries and enable the flow of accountability information, interpretive frameworks, and improvement strategies across the circuit. When a school receives a PBA signal – a BECE result, a GES inspection report, or a district performance ranking – high-

CCC schools can immediately draw on the circuit's collective interpretive resources: how did neighbouring schools perform? What instructional approaches are working elsewhere in the circuit? What does the circuit supervisor's synthesis of cross-school performance data suggest? These resources make the normative coherence dimension of IAP more achievable – because shared professional values are being developed collaboratively across schools, not constructed in isolation. They also make the structural coherence dimension more achievable – because dialogue mechanisms are being activated across school boundaries, not just within them. In low-CCC circuits, the same PBA signal arrives without this interpretive scaffolding: schools must make sense of accountability demands individually, without comparative context, shared strategies, or supervisory brokerage. The normative and structural resources for coherent IAP must be built from scratch within each school, making the conversion of PBA pressure into coherent internal accountability substantially harder. This is the social capital mechanism that makes the moderation finding theoretically intelligible: CCC amplifies IAP not by providing generic support but by specifically enriching the interpretive and relational conditions under which the three dimensions of internal accountability can be collectively constructed.

This moderation hypothesis speaks directly to the collection's interest in cross-school peer learning and collective capacity as mechanisms for building strong internal accountability. Critically, the mechanism through which CCC operates is a governance one, not merely a resource one. In high-CCC circuits, teachers' perceptions are consistent with circuit supervisors functioning as network leaders (Spillane, 2006): brokering accountability information across schools, convening structured inter-school professional dialogue, and creating shared improvement agendas that span individual school boundaries. Because the study measured teacher perceptions of circuit activity rather than supervisor behaviour directly, these characterisations are inferential rather than directly observed. This governance function transforms the circuit from an administrative structure into what Bryk et al. (2015) call a networked improvement community – a purposefully organised collaborative structure in which shared accountability goals, transparent performance data, and systematic cross-school learning are integrated into a common improvement practice. In low-CCC circuits, the same supervisory role exists structurally but functions primarily in compliance oversight mode: inspecting rather than facilitating, reporting upward rather than enabling horizontal peer learning, and managing individual schools' accountability responses in isolation. The CCC construct therefore indexes not simply the presence of cross-school activity but the nature of circuit-level governance – whether accountability is managed as a shared network problem or as an aggregation of individual school problems, which is the core governance question the collection seeks to address. It also captures the "dark side" dimension identified in the collection call: low-CCC circuits do not merely fail to help schools manage external demands; they may amplify the demoralising and compliance-generating effects of PBA pressure by leaving schools without the collaborative support needed to make sense of and respond to those demands professionally.

H4

Circuit collaborative capacity is positively associated with school-mean teacher professional agency at the between-school level.

H5

The positive association between PBA pressure and internal accountability processes is stronger in schools embedded in circuits with higher collaborative capacity (cross-level moderation).

Figure 1 illustrates the two-level MSEM framework.

[Figure 1 near here]

Figure 1. Two-level multilevel structural equation model (MSEM) of performance-based accountability, circuit collaborative capacity, internal accountability processes, and teacher professional agency in Ghanaian basic school circuits. Blue boxes = Level-1 (within-school) constructs. Green boxes = Level-2 (between-school) constructs. Solid arrows = structural paths. Orange dashed arrow = indirect mediation pathway (H3). Purple cross-level arrow = cross-level moderation of the PBA→IAP slope by CCC (H5). CCC = Circuit Collaborative Capacity; PDL = Principal Distributed Leadership; SIC = School Improvement Culture; PBA = Performance-Based Accountability Pressure; IAP = Internal Accountability Processes; TPA = Teacher Professional Agency.

Method

Research Design and Ethical Approval

A cross-sectional survey design was used. Ethical Approval No granted by the [anonymised institutional review board] (Approval No. [Anonymised Ref.]). All procedures were conducted in accordance with the Declaration of Helsinki (1964) and its subsequent amendments. Participation was voluntary, and written informed consent was obtained from each participant prior to data collection. Anonymity was maintained using non-identifiable response codes.

Participants and Sampling

The sampling frame comprised all basic school teachers (Kindergarten through Junior High School) employed in Ghana Education Service schools within six administrative regions: Greater Accra, Central, Eastern, Ashanti, Northern, and Volta. A three-stage cluster sampling procedure was employed. In Stage 1, 18 circuits were selected from the sampling frame using probability proportionate to size (PPS) sampling, stratified by region and circuit type (urban, peri-urban, rural) to ensure adequate representation of the full range of circuit contexts. In Stage 2, 52 schools within the selected circuits (mean: 2.9 schools per circuit; range: 2–4) were selected using PPS sampling. In Stage 3, all available teachers within the selected schools were invited to participate.

Of 967 teachers approached, 891 returned the questionnaire (response rate = 92.1%). Missing data were handled using full information maximum likelihood (FIML) estimation (Enders, 2010). Sixty-seven cases

with item non-response exceeding 15% on any scale were excluded, yielding a final analytic sample of N = 824 teachers nested within k = 52 schools across 18 circuits (mean school size = 15.8, SD = 4.3, range: 7–25; mean circuit size = 2.9 schools). The analytic sample comprised 468 females (56.8%) and 356 males (43.2%). The mean teaching experience was 11.4 years (SD = 7.2, range: 1–36). School levels represented: Kindergarten/Lower Primary (31.4%), Upper Primary (36.2%), and Junior High School (32.4%). School location: urban (38.3%), peri-urban (34.2%), and rural (27.5%).

Measures

All items were rated on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). McDonald's omega (ω) is reported as the primary reliability indicator, and Cronbach's alpha (α) is also reported for comparability. The full item wording, standardised factor loadings, inter-item correlation ranges, AVE, CR, and HTMT ratios are reported in Supplementary Table S1.

Performance-Based Accountability Pressure (PBA; eight items)

Items assessed teachers' perceptions of the degree to which their school is subject to external accountability demands based on standardised performance measures, including BECE outcomes, GES inspection results, and district performance rankings. Items were developed through iterative expert reviews (five educational accountability scholars; CVR = 0.85; CVI = 0.91) and adapted from Verger and Skedsmo's (2021) PBA enactment framework and Carnoy and Loeb's (2002) accountability pressure construct. Example items: "Performance on the BECE significantly influences the professional evaluation of teachers in this school"; "GES inspection results exert substantial pressure on how we organise our teaching in this school." McDonald's ω = 0.83; Cronbach's α = 0.81; AVE = 0.51; CR = 0.87.

Internal Accountability Processes (IAP; nine items)

Items assessed the degree to which teachers reported shared norms of instructional quality, mutual professional obligation, and coordinated collective response to external demands within their school. Items were newly developed following Abelmann and Elmore's (1999) three-component framework of normative coherence, structural coherence, and data use practices and reviewed by an expert panel of five educational leadership scholars (CVR = 0.84; CVI = 0.89). Example items: "In this school, teachers hold each other to shared expectations about what good teaching looks like" (normative coherence); "In this school, we collectively discuss what BECE results tell us about our instructional effectiveness" (data use practices). McDonald's ω = 0.86; Cronbach's α = 0.84; AVE = 0.52; CR = 0.89.

Teacher Professional Agency (TPA; ten items)

The items assessed teachers' capacity to make purposeful professional choices regarding their instruction, curriculum interpretation, and professional development in the context of institutional constraints. The ecological conceptualisation of Priestley et al. (2015) was operationalised through three

sub-dimensions: iterative orientation (drawing on past professional experience; four items), projective orientation (anticipating future professional possibilities; three items), and practical-evaluative orientation (exercising professional judgement in present instructional decisions; three items). The items were adapted from Soini et al. (2016) and the Teacher Professional Agency Inventory of Toom et al. (2015). Example items: “I actively adapt the SBC curriculum to the specific learning needs of my students, drawing on my professional experience”; “I can maintain my instructional convictions even when external accountability demands point in a different direction.” McDonald’s ω = 0.87; Cronbach’s α = 0.85; AVE = 0.53; CR = 0.91.

Circuit Collaborative Capacity (CCC; seven items; school-level aggregation)

The items assessed teachers’ perceptions of the quality of cross-school peer learning and professional collaboration within their circuit, including circuit supervisor-facilitated professional development, school-to-school improvement exchange, and structured opportunities for inter-school professional dialogue. Items were developed through iterative expert review (CVR = 0.83; CVI = 0.88) drawing on Bryk et al.’s (2015) collective capacity framework, Daly’s (2010) social network accountability constructs, and Ehren and Godfrey’s (2017) operationalisation of network-internal quality control. Example items: “Teachers in this school regularly participate in professional learning activities with teachers from other schools in our circuit”; “Our circuit supervisor organises structured opportunities for schools in this circuit to share and discuss assessment data and improvement strategies.”

Aggregation to the school level followed a two-step justification. First, within-school agreement confirmed that teachers within the same school reported similar CCC levels (mean r□□(j) = 0.77, range: 0.62–0.94), establishing within-school consensus as a prerequisite for aggregation. Second, between-school variance confirmed genuine school-level differences: ICC(1) = 0.16, ICC(2) = 0.71 (Snijders & Bosker, 2012), both exceeding recommended thresholds. Since CCC is theoretically a circuit-level property, the ICC indices also serve as an indirect indicator that schools within circuits share more similar CCC perceptions than schools across circuits, consistent with CCC reflecting circuit-level governance variation rather than idiosyncratic school perceptions. McDonald’s ω = 0.84; Cronbach’s α = 0.82.

Covariates

Two school-level covariates were included in the between-level model to isolate the unique contribution of CCC: Principal Distributed Leadership (PDL; six items adapted from Spillane et al.’s (2004) distributed leadership scale; ω = 0.82; ICC(1) = 0.14, ICC(2) = 0.69) and School Improvement Culture (SIC; five items adapted from Stoll et al.’s (2006) professional learning community framework; ω = 0.80; ICC(1) = 0.13, ICC(2) = 0.67). Individual-level covariates included teaching experience and school level (KG/LP, UP, JHS; dummy coded).

Confirmatory Factor Analysis and Measurement Invariance

Single-level CFA was estimated in R (v4.4.1) using the lavaan package (v0.6-18; Rosseel, 2012) prior to the MSEM. The four-factor model (PBA, IAP, TPA, CCC) yielded adequate fit: CFI = 0.94, TLI = 0.93, RMSEA = 0.051 (90% CI [0.044, 0.058]), SRMR = 0.056. All standardised loadings exceeded 0.54 (range: 0.54–0.83). Discriminant validity was supported by the Fornell-Larcker criterion and HTMT ratios (all below 0.85; Henseler et al., 2015). The HTMT ratio between IAP and TPA was 0.74, between PBA and IAP was 0.51, and between CCC and PDL (both Level-2 collaborative capacity aggregates) was 0.63, all confirming empirical distinctiveness. Measurement invariance across gender was supported at the metric level (ΔCFI = − 0.007; ΔRMSEA = − 0.003). A common method variance check using the unmeasured latent factor approach (Podsakoff et al., 2003) found that substantive loadings were attenuated by no more than 0.05 on average (χ^2 [31] = 37.4, p = .20), indicating that common method bias was not dominant. This finding means that even after accounting for the shared-source variance attributable to a generalised positive professional outlook, the structural relationships among PBA, IAP, TPA, and CCC remain substantively intact – the associations reflect theoretically distinct constructs rather than a single evaluative dimension. Additionally, the MSEM's between-level variance partitioning provides structural protection for the central H5 moderation finding: the cross-level interaction relates an aggregated school-level construct (CCC) to a within-level random slope, a relationship that is architecturally less susceptible to single-source consistency bias than a purely within-level mediation model. The within-level mediation pathway (H3) remains the portion of the model most vulnerable to CMV and should be interpreted with caution.

Nested model comparisons were conducted to evaluate the theoretical three-dimensional structures of IAP and TPA. The three-factor IAP model (normative coherence, structural coherence, data use practices) showed significantly better fit than a single-factor IAP alternative (ΔCFI = .031, ΔRMSEA = − .009, χ^2 [3] = 14.7, p = .002), with factor inter-correlations ranging from .61 to .74, confirming that the three dimensions are empirically related but meaningfully distinct components of the integrated IAP construct. A parallel comparison for TPA confirmed the three-factor ecological structure (iterative, projective, practical-evaluative) over a single-factor alternative (ΔCFI = .027, ΔRMSEA = − .008, χ^2 [3] = 11.4, p = .010), factor inter-correlations .58–.71, supporting the ecological three-dimensional operationalisation of teacher professional agency.

Analytical Strategy

MSEM was estimated in Mplus 8.10 (Muthén & Muthén, 1998–2023) using maximum likelihood with robust standard errors to account for non-normality and non-independence of observations. The MSEM framework simultaneously partitioned variance into within-school and between-school components and estimated structural parameters at each level following Preacher, Zyphur, and Zhang (2010). The within-level model specified PBA pressure as the predictor, IAP as the mediator, and TPA as the outcome, with teaching experience and school level as covariates. The between-level model specified CCC (plus PDL and SIC as covariates) as predictors of school-mean TPA and as a moderator of the within-level PBA→IAP slope (random slope). Within-level indirect effects were estimated via model constraints with 5,000 bootstrap samples. The PBA→IAP slope was specified as randomly varying across schools

(random slope MSEM), and the cross-level interaction was estimated by regressing the Level-1 slope onto CCC at the between-level. Significance was evaluated at α = .05 (two-tailed). ICC for the outcome was estimated from the unconditional model with 95% CI via likelihood-ratio profiling. Power analysis using the pwrss package in R indicated ≥ 80% power for fixed effects |β| ≥ 0.11 and cross-level interactions |γ| ≥ 0.13 at the observed sample sizes, consistent with Scherbaum and Ferreter's (2009) simulation-based guidance for k = 52 schools.

Results

Descriptive Statistics and Intraclass Correlation

Table 1 presents means, standard deviations, and within-level zero-order correlations. Teacher professional agency (M = 3.44, SD = 0.78) was above the scale midpoint. PBA pressure was positively correlated with IAP (r = .42, p < .001) and TPA (r = .29, p < .001). IAP showed a stronger correlation with TPA (r = .51, p < .001). VIFs ranged from 1.09 to 1.64, indicating no multicollinearity concerns. The unconditional MSEM yielded ICC(TPA) = 0.23 (95% CI [0.17, 0.30]), indicating that 23% of teacher professional agency variance was attributable to between-school differences, strongly justifying the multilevel analytical approach.

Table 1

Descriptive Statistics and Within-Level Zero-Order Correlations (N = 824; 52 Schools; 18 Circuits)

Variable	M	SD	1	2	3	4	5	6
1. PBA Pressure (PBA)	3.52	0.74	—					
2. Internal Accountability Processes (IAP)	3.38	0.71	.42***	—				
3. Teacher Professional Agency (TPA)	3.44	0.78	.29***	.51***	—			
4. Circuit Collaborative Capacity (CCC)□	3.26	0.69	.21***	.38***	.44***	—		
5. Principal Distributed Leadership (PDL)□	3.41	0.72	.18**	.36***	.39***	.52***	—	
6. School Improvement Culture (SIC)□	3.33	0.67	.24***	.43***	.47***	.58***	.61***	—

Note. N = 824 teachers; 52 schools; 18 circuits. All scales 1–5. □ = school-level aggregate. Correlations were within-level (L1) Pearson coefficients.

** p < .01; *** p < .001 (two-tailed).

MSEM Results

Table 2 presents the full MSEM results for all hypotheses. All five hypotheses were thus supported.

Table 2

MSEM Parameter Estimates (N = 824; 52 Schools; 18 Circuits)

Parameter	β or γ	SE	95% CI	Outcome
A. Within-Level (L1) Structural Paths				
PBA Pressure → Internal Accountability Processes (H1)	.43***	.06	[.31, .55]	H1 supported
Internal Accountability → Teacher Professional Agency (H2)	.48***	.05	[.38, .58]	H2 supported
PBA Pressure → TPA (direct, c')	.11*	.05	[.01, .21]	Partial mediation
B. Within-Level Indirect Effect (H3)				
PBA → IAP → TPA	.21***	.04	[.14, .29]	H3 supported
C. Between-Level (L2) Paths				
CCC → School-Mean TPA (H4)	.38***	.08	[.22, .54]	H4 supported
PDL → School-Mean TPA	.22**	.08	[.06, .38]	Covariate
SIC → School-Mean TPA	.19*	.09	[.01, .37]	Covariate
D. Cross-Level Interaction (H5)				
CCC × PBA→IAP Slope (H5)	.26**	.09	[.08, .44]	H5 supported
E. Random Effects and Variance Explained				
ICC (TPA) .23 [95% CI: .17, .30]				
Slope variance τ_{11} (PBA→IAP) .028 (p = .006)				
Within-level R^2 (TPA) 19.8%				
Between-level R^2 (TPA) 32.1%				
F. Model Fit				
CFI / TLI 0.93 / 0.92				
RMSEA [90% CI] 0.055 [0.048, 0.062]				
SRMR (within / between) 0.061 / 0.057				

Note. N = 824 teachers nested within 52 schools across 18 circuits in Ghana. L1 βs are standardised. L2 γs were unstandardised. 95% CIs from parametric bootstrapping (5,000 samples). Within-level predictors were group-mean centred, and between-level predictors were grand-mean centred. CCC = Circuit Collaborative Capacity; PDL = Principal Distributed Leadership; SIC = School Improvement Culture.

* p < .05; ** p < .01; *** p < .001.

Within-Level Direct Paths (H1, H2)

At the within-school level, PBA pressure was positively and significantly associated with internal accountability processes (β = 0.43, SE = 0.06, p < .001), supporting H1. Internal accountability processes were positively and substantially associated with teacher professional agency (β = 0.48, SE = 0.05, p < .001), thus supporting H2. PBA pressure also retained a significant direct association with TPA after accounting for IAP (c' = 0.11, SE = 0.05, p = .028), indicating partial rather than full mediation by internal accountability.

Within-Level Mediation (H3)

The indirect effect of PBA pressure on professional agency via internal accountability processes was significant (indirect = 0.21, SE = 0.04, 95% CI [0.14, 0.29], p < .001), supporting H3. The total effect of PBA on TPA was 0.32 (95% CI [0.22, 0.42]), and the indirect pathway accounted for approximately 66% of this effect. This pattern is consistent with Elmore's (2004) thesis that internal accountability is the primary mechanism through which external accountability demands are productively converted into professional outcomes for teachers: the accountability–agency relationship is substantially carried by the internal accountability pathway rather than by the direct effect of external pressure on teacher agency.

Between-Level Results (H4)

At the between-school level, circuit collaborative capacity was positively and significantly associated with school-mean teacher professional agency (γ = 0.38, SE = 0.08, p < .001), supporting H4 after controlling for principal distributed leadership (γ = 0.22, p = .006) and school improvement culture (γ = 0.19, p = .034). CCC accounted for 32.1% of the between-school variance in teacher professional agency, indicating that the circuit network context within which schools are embedded is a substantial determinant of the aggregate level of teacher professional agency in these schools.

Cross-Level Moderation (H5)

The Level-1 random slope for the PBA→IAP association varied significantly across schools (τ_{11} = 0.028, p = .006), justifying the cross-level moderation test. The cross-level interaction between CCC and the PBA→IAP slope was statistically significant (γ = 0.26, SE = 0.09, p = .009), supporting H5. Table 3 presents the simple slopes. At high CCC (+ 1 SD), the PBA→IAP slope was 0.57 (SE = 0.06, p < .001); at low CCC (− 1 SD), it was 0.31 (SE = 0.08, p = .001); the slope difference was 0.26 (SE = 0.10, z = 2.60, p = .009). This indicates that the PBA→IAP slope was approximately 84% larger in schools embedded in high-CCC circuits than in low-CCC circuits, demonstrating that circuit-level collaborative capacity substantially amplifies schools' capacity to convert external accountability pressure into coherent internal accountability processes.

Table 3

Simple Slopes: PBA Pressure → Internal Accountability at High and Low Circuit Collaborative Capacity

Condition	Slope (β)	SE	p	Interpretation
High Circuit CCC (+ 1 SD): PBA Pressure → IAP	.57	.06	< .001	PBA strongly mobilises internal accountability
Low Circuit CCC (− 1 SD): PBA Pressure → IAP	.31	.08	.001	PBA less effectively converted into IAP
Slope difference (Δ = .26, SE = .10, z = 2.60)			.009	CCC amplifies PBA→IAP conversion (H5)

Note. Simple slopes at ± 1 SD of Circuit Collaborative Capacity. N = 824; 52 schools; 18 circuits.

[Figure 2 near here]

Figure 2. Cross-level interaction: Circuit Collaborative Capacity (CCC) moderates the association between PBA pressure and internal accountability processes. Simple slopes at high (+ 1 SD) and low (− 1 SD) CCC levels. Error bands = ± 1 SE. N = 824; 52 schools; 18 circuits. High CCC: β = 0.57, SE = 0.06, p < .001; Low CCC: β = 0.31, SE = 0.08, p = .001; Slope difference = 0.26, SE = 0.10, z = 2.60, p = .009.

Robustness Checks

Four robustness analyses were performed. First, a random-intercept-only model without the random slope for PBA→IAP yielded a significantly worse fit (χ^2 [2] = 12.8, p = .002), confirming that the PBA→IAP slope varied meaningfully across schools and justifying the random slope specification. Second, substituting grand mean centring for group mean centring of the within-level predictors produced substantively equivalent fixed-effect estimates (all within 0.03 of the primary model estimates). Third, a reverse-direction model specifying TPA as the predictor of IAP produced a non-significant cross-level interaction (γ = −0.04, SE = 0.11, p = .72) and substantially worse fit (CFI decrease of 0.05; RMSEA increase of 0.014), supporting the theoretically specified directionality. Fourth, the model was re-estimated excluding the 72 teachers in circuits with only two schools (to address potential instability in the smallest circuits), yielding structurally equivalent results with all primary paths within one standard error of full-sample estimates.

Discussion

This study examined whether and how Ghana's mandated circuit school networks mediate the relationship between external accountability demands and teacher professional agency. Three substantive findings are discussed.

Internal Accountability as the Productive Mechanism

The most robust finding from the within-level model is the internal accountability mediation pathway: PBA pressure was associated with IAP (β = 0.43), IAP was associated with TPA (β = 0.48), and the indirect pathway accounted for approximately 66% of the total PBA–TPA association. This structural pattern is consistent with Elmore's (2004) central thesis that external accountability demands are productively channelled through the quality of internal accountability processes rather than acting directly on teacher behaviour and provides a first quantitative multilevel test of this thesis in a Sub-Saharan African context.

The positive direction of the PBA→TPA association (both direct and indirect) warrants interpretation. The Ghanaian PBA regime – BECE results, GES inspections, district performance rankings – appears, in the cross-sectional structural analysis, to be positively rather than negatively associated with teacher professional agency, contrary to the dominant narrative in accountability scholarship that PBA erodes professional autonomy and constrains instructional discretion (Ball, 2003; Mockler, 2011). Three competing explanations are plausible. First, the institutional character of Ghana's PBA regime may be consequential: unlike high-stakes systems that close or restructure schools based on standardised test results (Ball, 2003; Lingard et al., 2013), Ghana's accountability regime carries moderate consequences – reputational and supervisory attention rather than structural sanctions. Achinstein and Ogawa (2006) demonstrate that in accountability contexts where professional identity is not existentially threatened, external demands can activate rather than constrain professional agency by providing a shared external referent around which collective professional work can be organised. Consistent with Lingard et al.'s (2013) distinction between punitive and supportive accountability regimes, Ghana's PBA system may function in a mode that challenges schools to improve without imposing the identity-threatening pressures that produce the agency-eroding effects documented in English and Australian contexts (Mockler, 2011). Second, selection effects may be operative: teachers who have remained in the profession through a period of reform intensification may be those with higher baseline professional agency. Third, the cross-sectional design cannot establish causal direction; the positive association may reflect that schools with higher teacher professional agency generate stronger accountability performance data, producing a reverse-direction relationship. The robustness check testing this reverse-direction model (Section 4.4) provides partial reassurance: when TPA is specified as the predictor of IAP, the cross-level interaction becomes non-significant and fit substantially worsens, which is inconsistent with a pure reverse-causation account. Longitudinal research is nonetheless needed to adjudicate definitively among these accounts.

Circuit Collaborative Capacity as a Network-Level Resource

The cross-level moderation finding – that the PBA→IAP slope was 84% larger in high-CCC circuits than in low-CCC circuits – is the study's primary contribution to the collection's network accountability question. It demonstrates that school networks are not neutral conduits of external accountability demands: the collaborative capacity of the circuit network within which a school is embedded is

meaningfully associated with that school's capacity to convert external accountability pressure into coherent internal accountability processes.

The theoretical interpretation is consistent with Ehren and Godfrey's (2017) analysis of multi-academy trust accountability: in networks where inter-school quality assurance mechanisms are well-developed, external accountability demands are mediated through collective professional dialogue, comparative performance benchmarking, and shared improvement strategies that transform accountability pressure into a professionally generative stimulus rather than a compliance-generating threat. In the Ghanaian circuit context, circuits in which teachers perceive high collaborative capacity appear to be those in which circuit supervisors facilitate structured cross-school professional exchange, organise inter-school data dialogue, and create opportunities for peer learning – providing the network infrastructure through which external GES demands are collectively interpreted and internally responded to. This interpretation, while consistent with the CCC data, should be confirmed in future research that measures supervisor behaviour directly. Circuits that lack this infrastructure leave individual schools to manage PBA pressure in relative professional isolation.

The between-level main effect of CCC on school-mean TPA ($\gamma = 0.38$) is equally theoretically significant: it indicates that circuit-level collaborative capacity has a direct aggregate effect on teacher professional agency beyond the mediated pathway through internal accountability. Schools in high-CCC circuits have teachers with higher professional agency on average, a finding consistent with Daly's (2010) social capital argument that network relationships are themselves a professional resource that expands the possibilities teachers see for their professional practice.

The "Dark Side": Low-CCC Circuits and Accountability Without Network Support

Simple slope analysis revealed that the PBA→IAP association was positive and significant even in low-CCC circuits ($\beta = 0.31$, $p = .001$), indicating that external accountability pressure stimulates some internal accountability response regardless of network context. However, the substantially weaker slope in low-CCC circuits suggests that this response is less coherent, coordinated, and professionally productive than in high-CCC circuits. In the ecological agency framework (Priestley et al., 2015), low-CCC circuits may be characterised by what Biesta et al. (2017) call "thin agency": teachers and schools respond to accountability demands but do so in ways that are reactive and compliance-oriented rather than purposeful and professionally elaborated.

This finding speaks to the "dark side" of school networks identified in the collection call. Networks that fail to develop collective capacity do not merely leave external accountability demands unmediated; they create a structural condition in which accountability pressure reaches schools without the collaborative scaffolding needed to make sense of and respond to that pressure professionally. In low-CCC circuits, the significant but substantially weaker PBA→IAP slope (0.31 versus 0.57) suggests a specific accountability dynamic: external demands stimulate some internal response, but that response is

characterised by what Ehren and Godfrey (2017) describe as accountability “without quality control” – schools react to accountability signals individually and reactively rather than collectively and constructively. The absence of circuit-level collaborative infrastructure means that the normative coherence and shared data use that constitute strong internal accountability remain under-developed; each school’s response to BECE results or GES inspection feedback is locally improvised rather than network-informed. This pattern is consistent with what Hargreaves and Fullan (2012) identify as the central risk of accountability without professional capital: external pressure produces performance without capacity, and compliance without learning. The network governance failure in low-CCC circuits is not the absence of circuit supervisors – they are present – but the absence of the facilitative, learning-oriented leadership that transforms administrative presence into network functioning. Circuits with low CCC appear to be those in which the supervisory function is oriented primarily toward accountability compliance rather than collaborative capacity-building – an interpretation consistent with the CCC data, though not directly observed in supervisor behaviour. If confirmed, this distinction may be among the most consequential sources of between-school inequality in how PBA demands translate into professional practice.

Implications for School Network Leadership and Accountability Policy in Ghana

For circuit supervisors and Ghana Education Service district officers, the findings suggest that the professional development and collaborative facilitation functions of circuit supervision are at least as important as the compliance and inspection functions. Circuits in which supervisors actively facilitate structured inter-school professional dialogue, comparative data use, and cross-school peer learning show substantially stronger internal accountability responses to external demands. Investment in circuit supervisor training for collaborative leadership, as distinct from inspection compliance, may be among the highest-leverage policy interventions available for improving how PBA demands are translated into school quality improvements.

For national accountability policy, the findings suggest that the design of GES inspection and assessment feedback systems should explicitly consider the circuit level as the unit of accountability reporting and professional support, not merely the individual school. Circuit-level performance reports designed to facilitate cross-school dialogue rather than simply rank individual schools may better leverage the accountability–agency pathway identified in this study. This is consistent with the broader school network literature’s recommendation that accountability systems be designed to operate at the network level, not only at the school level (Ehren & Godfrey, 2017; Bryk et al., 2015).

Limitations

Several limitations warrant acknowledgement. The cross-sectional design precludes causal inference; all reported associations are cross-sectional structural relationships that cannot establish temporal precedence. Longitudinal designs – tracking how circuit collaborative capacity develops over time and

how changes in CCC predict changes in internal accountability and teacher agency – are needed to establish the developmental trajectory of the network accountability relationship. The measures of PBA pressure, IAP, TPA, and CCC are all based on self-report survey data from teachers; the most consequential CMV risk for this model is consistency bias – teachers with generally positive professional orientations may rate both CCC and TPA higher, potentially inflating the H4 between-level association. The CMV check reported in the Measures section provides partial reassurance but cannot fully rule out this risk. Objective measures of accountability pressure (inspection records, BECE data), structural network data (actual patterns of cross-school interaction), and observational measures of internal accountability practices would provide stronger construct validity and enable triangulation with the survey findings. The sampling frame covered six regions and 18 circuits, which, while geographically diverse, may not represent all circuit contexts in Ghana, particularly the smallest and most remote circuits, which may be systematically underrepresented. The newly developed IAP and CCC scales lack external validation against observational or documentary measures of internal accountability and cross-school collaboration; future research should examine convergent validity against these alternatives. A related concern is the small-n aggregation for CCC: with a mean of 2.9 schools per circuit (range: 2–4), school-level CCC scores are aggregated from very small within-circuit samples. Although the ICC(2) = 0.71 meets the recommended threshold, the narrow circuit samples create uncertainty about whether individual school CCC scores reliably index circuit-level culture; replication with larger within-circuit school samples would strengthen confidence in the aggregation. Finally, the MSEM used product-of-coefficients for within-level mediation; a full doubly latent MSEM (Marsh et al., 2009) would additionally model measurement error at the between level and is recommended for replication studies with larger Level-2 samples.

Conclusion

This study demonstrates that school networks – operationalised as Ghana's mandated basic school circuit clusters – are substantively important moderators of the external accountability–teacher professional agency relationship. Three findings advance the collection's agenda. First, internal accountability processes substantially mediate the association between PBA pressure and teacher professional agency, providing the first MSEM evidence for Elmore's (2004) internal accountability thesis in Sub-Saharan Africa and operationalising the thesis as a testable structural model. Second, circuit collaborative capacity is a significant between-level predictor of school-mean teacher professional agency, a finding consistent with network-level relational and professional resources being associated with teacher agency beyond school-internal conditions. Third, and most importantly for the collection, the PBA→IAP slope is 84% stronger in schools embedded in high-CCC circuits than in low-CCC circuits (0.57 versus 0.31), a cross-level pattern consistent with the interpretation that circuit collaborative capacity amplifies schools' capacity to convert external accountability pressure into coherent internal accountability. This cross-level finding is consistent with circuit collaborative capacity functioning as an important structural condition for productive accountability enactment.

For policy and practice, these findings converge on a single implication: the findings are consistent with the proposition that circuit-level governance represents an important and currently underutilised level of accountability intervention, alongside, rather than instead of, school-level approaches. Building circuit collaborative capacity through circuit supervisor professional development, structured cross-school professional learning, and accountability reporting systems designed to facilitate inter-school dialogue rather than merely rank schools is an evidence-consistent strategy warranting more deliberate policy attention in the design of Ghana's accountability infrastructure.

For researchers, this study provides a methodological template (two-level MSEM with cross-level moderation of a mediated pathway) for examining school network accountability in other contexts. Replication in contexts with formalised network governance (Multi-Academy Trusts, networked improvement communities) and different PBA intensities would establish the boundary conditions of the network moderation effect and test whether the Ghanaian circuit findings generalise to voluntary as well as mandated school network structures.

Declarations

Ethics Approval:

[Anonymised institutional review board] (Approval No. [Anonymised Ref.]). All procedures were conducted in accordance with the Declaration of Helsinki (1964) and subsequent amendments.

Consent for publication:

Informed consent was obtained from all participants.

AI Disclosure

Grammatical editing was performed using Grammarly (Grammarly Inc., San Francisco, CA, USA). No large language models or generative AI tools were used to produce the manuscript content, conduct analyses, or generate figures. The sole author accepts full responsibility for all the content.

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Author Contribution

S.K.A.: Conceptualisation, Methodology, Formal Analysis, Investigation, Data Curation, Writing – Original Draft, Writing – Review & Editing, Visualisation, Project Administration.

The author declares no conflict of interest.

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[Acknowledgements are provided on the separate Title Page.]

Data Availability

The datasets generated and analysed during the current study are available from the author upon reasonable request.

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Figures

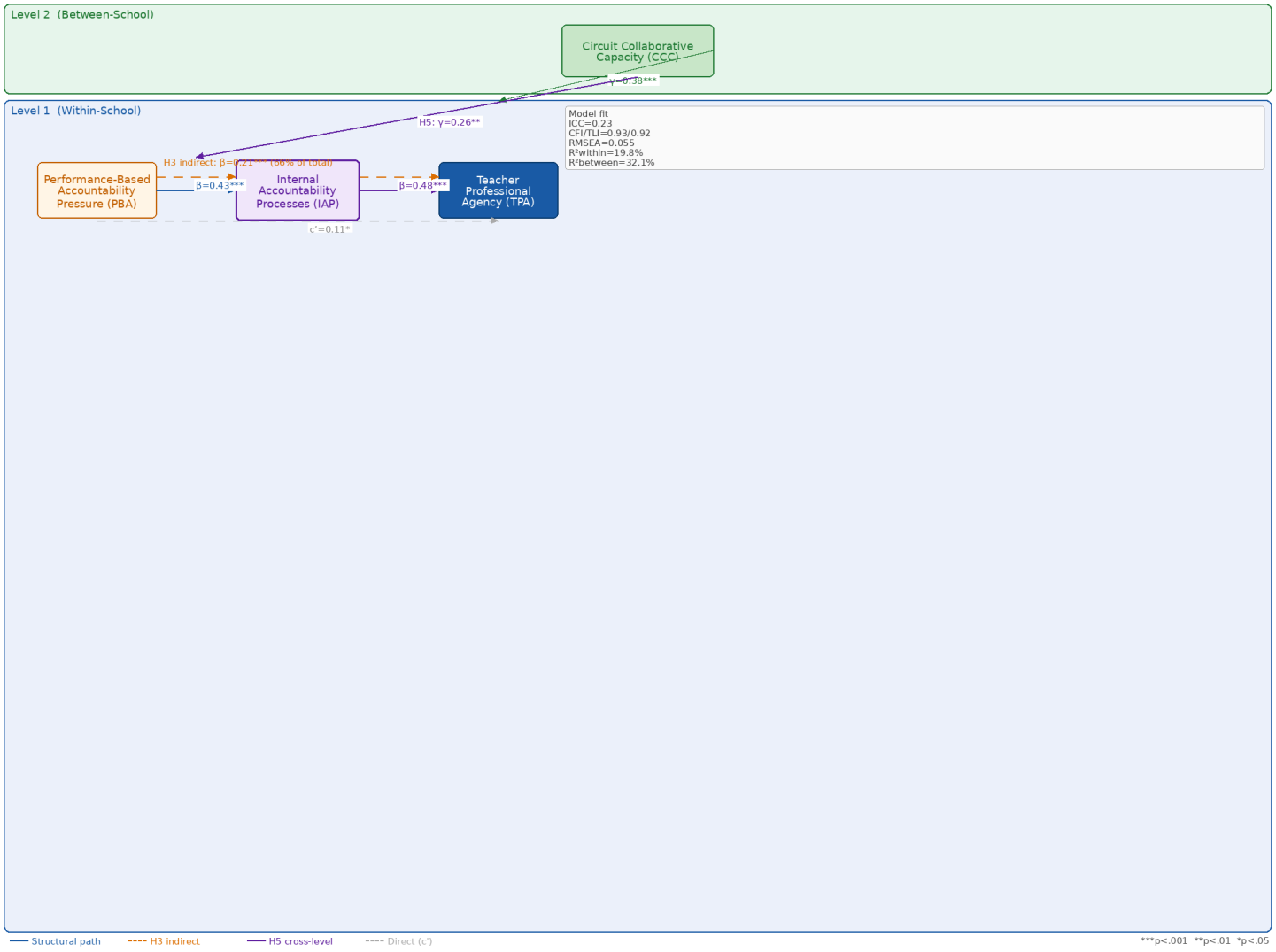


Figure 1

Two-level multilevel structural equation model (MSEM) of performance-based accountability, circuit collaborative capacity, internal accountability processes, and teacher professional agency in Ghanaian basic school circuits. Blue boxes = Level-1 (within-school) constructs. Green boxes = Level-2 (between-school) constructs. Solid arrows = structural paths. Orange dashed arrow = indirect mediation pathway (H3). Purple cross-level arrow = cross-level moderation of the PBA→IAP slope by CCC (H5). CCC = Circuit Collaborative Capacity; PDL = Principal Distributed Leadership; SIC = School Improvement Culture; PBA = Performance-Based Accountability Pressure; IAP = Internal Accountability Processes; TPA = Teacher Professional Agency.

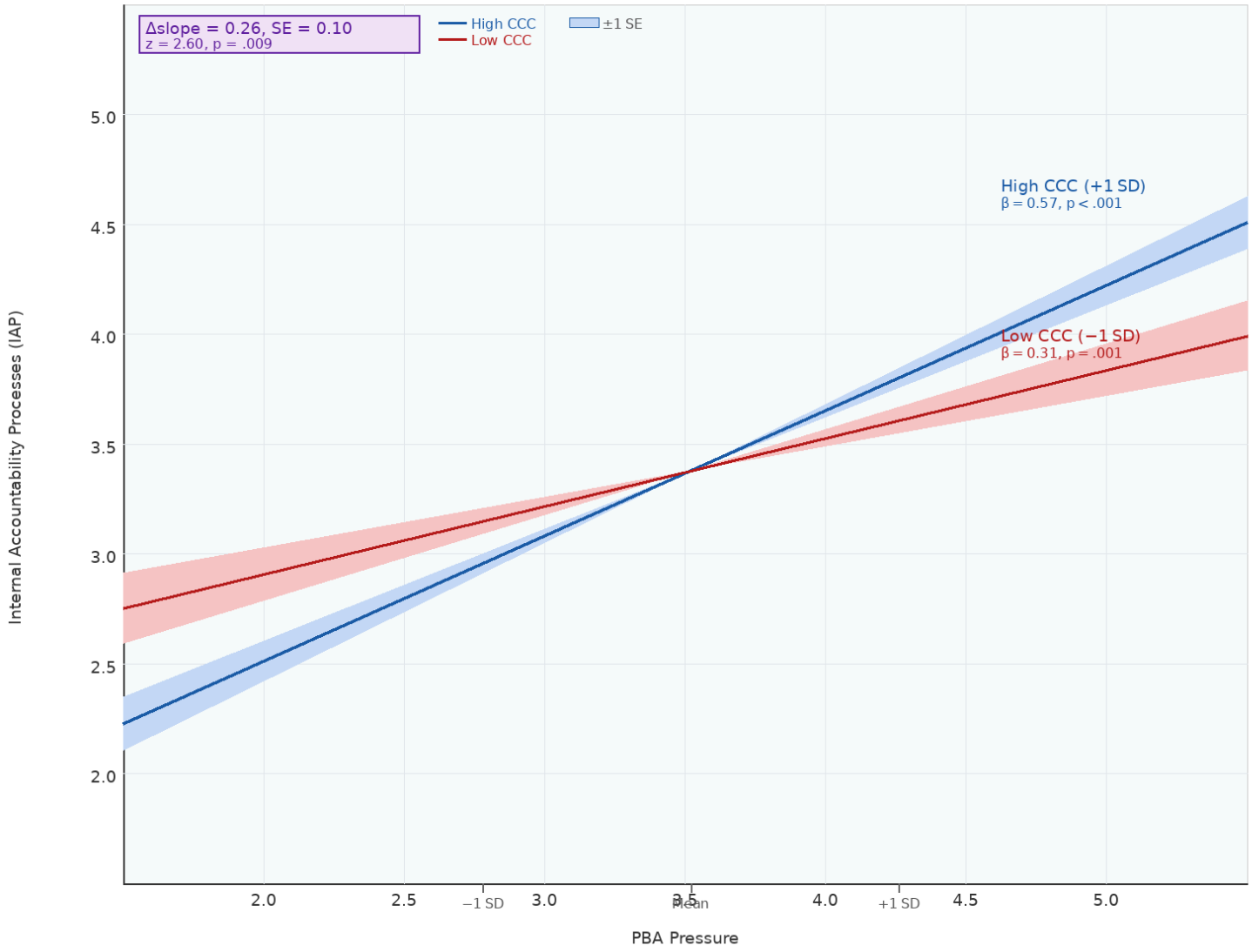


Figure 2

Cross-level interaction: Circuit Collaborative Capacity (CCC) moderates the association between PBA pressure and internal accountability processes. Simple slopes at high (+1 SD) and low (−1 SD) CCC levels. Error bands = ±1 SE. N = 824; 52 schools; 18 circuits. High CCC: β = 0.57, SE = 0.06, p < .001; Low CCC: β = 0.31, SE = 0.08, p = .001; Slope difference = 0.26, SE = 0.10, z = 2.60, p = .009.

Supplementary Files

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- EAEASupplementaryTableS1.docx