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## EDITED BY

Patricia Schuler,  
Zurich University of Teacher Education,  
Switzerland

## REVIEWED BY

Nanine Lilla,  
Free University of Berlin, Germany  
Joseph Lobo,  
Bulacan State University, Philippines

## \*CORRESPONDENCE

Stephan Kielblock  
✉ stephan.kielblock@uni-oldenburg.de

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# Rethinking leadership in extended education: how collaborative development drives organizational quality

Stephan Kielblock\*

Carl von Ossietzky University of Oldenburg, Oldenburg, Germany

Effective school leadership significantly impacts student learning outcomes and equitable educational opportunities. However, the increasing complexity of educational environments—marked by expanded learning spaces and diverse institutional involvement—presents new challenges. This study investigates leadership approaches within Germany's extended education system, using all-day schooling as a case study. Data were collected from 1,355 school leaders across primary and secondary schools via a standardized online questionnaire. Structural equation modeling was employed to explore the effects of shared leadership responsibility and collaborative school development on key organizational quality indicators: designated collaboration time, breadth of extracurricular aims, and curricular-extracurricular synergy. The findings highlight that collaborative school development, rather than shared leadership responsibility, is the primary driver of organizational quality across all measured indicators. Shared leadership responsibility, while less impactful overall, contributes to the allocation of staff collaboration time, a crucial factor for teamwork and integration. These results underscore the importance of fostering collaborative practices within leadership frameworks to enhance educational quality in extended education contexts. This study provides insights into broader leadership strategies that prioritize collaboration as a cornerstone of innovation and progress in extended education.

## KEYWORDS

extended education, leadership, school development, shared leadership responsibility, collaborative school development, all-day schools, organizational quality, collaboration

## 1 Introduction

### 1.1 Problem of the study

Effective school leadership exerts a significant and well-documented influence on students' learning outcomes and overall educational experiences (Hattie, 2024). By shaping school culture and promoting high-quality, equitable educational opportunities, leaders play a critical role in ensuring student success. However, the increasing diversity of educational programs, the expansion of learning environments beyond traditional classrooms, and the growing involvement of varied institutions and staff in supporting students collectively intensify the complexity of leadership. This evolving landscape raises important questions about how leadership responsibilities and organizational development strategies can effectively address and navigate such multifaceted challenges.

This study contributes to this area of inquiry by examining leadership approaches within the context of the German education system. Initiatives such as the introduction of

all-day schooling and inclusive education have significantly increased the complexity of school operations in Germany (Kielblock et al., 2017), making it an ideal setting to investigate forms of leadership.

While this study focuses on Germany, its findings hold relevance for other education systems that have expanded learning opportunities beyond traditional school hours. Any model of extended education similarly requires school leaders to coordinate diverse stakeholders, align extracurricular activities with curricular goals, and foster collaboration among staff. By analysing leadership in Germany's all-day schooling context, this study provides insights that may inform leadership strategies in other nations facing similar organizational challenges in extended education.

## 1.2 Context of the study

This study explores Germany as a context for investigating shared leadership responsibilities and collaborative approaches to organizational development. The German education system provides an exemplary setting for such inquiries due to its structural and policy transformations. Over the past two decades, Germany has undergone substantial school reforms. Among these is the shift from a traditional half-day school model—centred primarily on curricular instruction—to all-day schools that integrate classes, extracurricular activities, and meal provisions (Stecher and Maschke, 2013).

According to the Standing Conference of the Ministers of Education and Cultural Affairs—KMK (2023a), all-day schools are educational institutions in primary and lower secondary education in Germany that provide extended care and learning opportunities. These include full-day supervision for at least seven hours daily on a minimum of three days per week. Additionally, on days with an extended program, participating students are provided with a lunch. The organization and implementation of all-day offerings fall under the responsibility or co-responsibility of the school principal. These offerings are conceptually aligned with regular classroom instruction, ensuring an integrated educational approach. Currently, over 70% of schools in Germany are classified as all-day schools (KMK, 2023a).

The increased complexity of all-day schools demands deliberate school development strategies to ensure the seamless integration of varied learning environments and to foster effective collaboration among diverse teaching staff. These efforts are crucial for establishing high-quality educational settings and achieving positive outcomes for students. The multifaceted nature of all-day schools highlights the importance of cohesive school development practices that promote synergy across the curricular and extracurricular domains. In this way, research underscores the critical role of collaborative leadership and shared responsibility in enhancing staff cooperation and cultivating positive learning environments (Huber, 2020; Kielblock, 2023a). In the German context, the recent legal mandate for access to all-day education for primary school students (GaFöG, 2021) further accentuates the challenges of leadership and school development, especially in primary education.

This study focuses on the German context, with the all-day school as a setting where collaborative leadership is essential. It serves as a context in which complex leadership settings are highly visible and thus can be effectively analyzed. The findings of this study, however, also provide valuable insights that extend beyond Germany and are

applicable to other contexts where various actors and institutions are involved in providing extended education.

## 1.3 Collaborative forms of leadership

Before the 2000s, it was common in school leadership research to focus primarily on the individual agency of leaders such as principals and their downward influence on staff. Spillane et al. (2001) challenged this understanding of school leadership. They argue that this perspective is insufficient, as leadership cannot be reduced to what leaders know and do in isolation. Instead, they propose a distributed framework, which views leadership as an activity shaped by the interactions between different leaders, followers, and their shared school environment. According to Spillane et al. (2001), this distributed perspective reframes leadership as a practice that is socially and situationally distributed, offering a more nuanced understanding of how instructional change is enacted in schools.

### 1.3.1 Definition(s) of the concept

The concept of distributed leadership has garnered significant interest subsequent to Spillane et al. (2001). Yet, it remained subject to diverse and occasionally conflicting interpretations. Harris (2008) describes distributed leadership as a lateral form of leadership, wherein influence and decision-making emerge from interactions among organizational members rather than relying solely on individual direction. However, this does not negate the importance of formal leadership structures; rather, distributed leadership involves an interplay between vertical and lateral processes.

Harris (2008) noted that definitions of distributed leadership span from normative to theoretical perspectives, with literature overlapping substantially with concepts of shared, collaborative, democratic, and participative leadership. This was underlined by Mayrowetz (2008), too, who examined the diverse usages of distributed leadership in the literature. Four primary interpretations were found: as a theoretical lens for understanding leadership activities, as a means of fostering democracy, as a strategy for enhancing efficiency and effectiveness, and as a tool for building human capacity. Mayrowetz (2008) concludes that striving for a universal definition of distributed leadership may be unwise, advocating instead for research that clearly defines the concept in relation to school improvement and leadership development, ensuring both theoretical grounding and practical relevance.

In later reviews, the diversity of definitions is still present. Tian et al. (2015) review research on distributed leadership from 2002 to 2013, noting its growing independence and scope, but highlighting the lack of a universally accepted definition as a key limitation. Harris et al. (2022) review two decades of research on distributed leadership. According to their literature analysis, early evidence (2001–2011) highlighted the positive relationship between distributed leadership, organizational improvement, and student achievement, though critiques emerged regarding its conceptual clarity. Contemporary research (2011–2021) spans broader contexts and disciplines, introduces advanced measurement tools, and continues to explore distributed leadership's impact across variables such as trust and optimism.

Further attempts are made to systematize the field and clarify the different terms. According to De Jong et al. (2023), distributed

leadership should be conceptualized as a sociocultural and contextually embedded process of social interaction. It involves multiple individuals collectively exerting influence within a given context. D'Innocenzo et al. (2014) highlight the fragmented nature of shared leadership definitions and propose an integrative definition: „Shared leadership is an emergent and dynamic team phenomenon whereby leadership roles and influence are distributed among team members” (D'Innocenzo et al., 2014, p. 1968).

These attempts illustrate the difficulty of adequately accounting for the social dynamics in the definition of distributed leadership, while also preventing the 'lead' component from dissolving entirely into the conception of social interactions. In this way, it gets clear that leadership responsibilities are as important as the relation of leadership practices to school development processes.

In the following sections, shared leadership responsibility and collaborative school development are treated as distinct concepts. *Shared leadership responsibility* refers to the extent to which the management responsibility of the extended school program is distributed among multiple individuals or groups rather than being concentrated in a single leader or role. It is characterized by the involvement of steering groups, committees, or other collaborative structures within or beyond the school, whereas non-shared leadership is defined by individual management responsibility. *Collaborative school development*, in contrast, captures the extent to which various stakeholder groups actively participate in school development processes. This concept reflects the number of stakeholder groups—including school leadership, teachers, school staff, external staff, parents, students, etc.—engaged in shaping the school's development.

### 1.3.2 Impact of leadership on instruction and school performance

Research has put much emphasis on effects on instruction and school performance. The meta-analysis conducted by D'Innocenzo et al. (2014) revealed two key insights. First, a significant positive relationship between shared leadership and team performance was found, supporting the notion that shared leadership enhances team outcomes. However, the magnitude of this effect varied across studies. Second, the study demonstrated that the way shared leadership is theoretically conceptualized and measured plays a critical role regarding the effect sizes. For example, network-based conceptions, which focus on dyadic leadership exchanges within teams, yielded higher correlations with team performance compared to more holistic, aggregated measures of shared leadership. These findings might remind us that “distributed leadership is not a panacea; it depends on how it is shared, received and enacted” (Harris and DeFlaminis, 2016).

De Jong et al. (2023) explore how distributed leadership is embedded in sociocultural contexts across individual, team, and school levels. Their study of 14 collaborative innovation-oriented teacher teams found that stronger distributed leadership practices foster a collaborative spirit, characterized by teachers seeking advice on schoolwide improvements, engaging beyond formal roles, and principals promoting innovation as a joint endeavor. Teams with such practices demonstrated a shared commitment to improving education, highlighting the link between distributed leadership and collective educational development.

Wahlstrom and Louis (2008) investigated how leadership is experienced and enacted by teachers, focusing on the interactions

between principals and teachers, as well as between teachers themselves, to understand their impact on classroom instructional practices. Using data from a survey of 4,165 teachers across K-12 schools in the United States, the study identified three distinct instructional teaching behaviors: (1) Standard Contemporary Practice, (2) Focused Instruction, and (3) Flexible Grouping Practices. The findings revealed that the presence of shared leadership and a professional community significantly influenced the strength of these teaching styles.

Hallinger and Heck (2010) investigated the effects of collaborative leadership on school improvement and student reading achievement through a longitudinal study of 192 elementary schools in the United States. Using latent change analysis, they examined how changes in leadership influenced academic capacity and reading outcomes over four years. The study revealed that collaborative leadership had significant direct effects on enhancing schools' academic capacity and indirect effects on students' reading achievement. Additionally, it identified varying growth trajectories among schools, reflecting diverse improvement processes. These findings underscore the role of collaborative leadership in fostering organizational improvement and student success.

### 1.3.3 Distributed leadership in the context of all-day schools

Today, there are increasing demands on schools to respond to social, economic, ecological, and cultural changes. Pearce (2004) argues that shared leadership is particularly effective in contexts that require a high level of creativity, as it fosters collaborative development of innovative solutions. This is particularly relevant to the current paper, which explores leadership in the context of extended education, where both creativity and the management of complex, dynamic educational environments are crucial. In this way, Huber (2020) highlights that German all-day schools (Ganztagsschulen) might represent a pivotal response to these challenges. He underscores that leadership in all-day schools should be grounded in cooperation, with the primary aim of fostering students' educational biographies and enhancing educational quality. Cooperative leadership is characterized by shared decision-making, empowerment of staff, delegation of responsibilities, and the collective determination of goals, aligning leadership practices with the broader mission of schools as holistic, life-encompassing learning environments.

## 1.4 Toward effective learning environments

International research on extended education has emphasized that extracurricular, afterschool and out-of-school time activities have positive effects on students (Durlak et al., 2010; Feldman and Matjasko, 2005; Metsäpelto and Pulkkinen, 2014; Abraczinskas et al., 2016; Murray et al., 2024) and is able to reduce social inequalities (O'Donnell et al., 2022; Heath et al., 2022; Bouchard et al., 2023). A similar state of research seems to be present for Germany (Kielblock and Maaz, 2024).

### 1.4.1 Effectiveness research in Germany—an overview

Empirical research from Germany provides limited evidence for direct benefits of all-day schooling compared to half-day schooling.

Positive effects, where identified, predominantly related to social behavior (Kanevski and Salisch, 2011; Salisch and Kanevski, 2011; Reinders et al., 2013). Some studies suggest differential benefits for specific groups (Strietholt et al., 2015). Similarly, reduced associations between socioeconomic background and mathematics performance are observed in all-day schools where attendance is compulsory for all students (Züchner and Fischer, 2014).

A longer duration of participation in all-day programs is linked to academic and behavioral improvements. Evidence indicates gains in goal orientation, grades (Fischer et al., 2009), transitions to higher education tracks (Seidlitz and Zierow, 2022), prosocial behavior, and mathematics achievement (Arnoldt, 2021). Long-term participation correlates with positive social behavior (Kuhn and Fischer, 2011b; Fischer et al., 2011b), reduced grade repetition risk (Steiner, 2011), and greater educational attainment (Arnoldt et al., 2016). It also positively affects well-being, such as school enjoyment (Fischer and Brümmer, 2012). A higher intensity of program attendance is associated with more positive grades (Kuhn and Fischer, 2011a).

Voluntary engagement in programs appears crucial; students opting into reading-focused activities exhibit improvements in reading comprehension and motivation (Fischer et al., 2016; Sauerwein and Heer, 2020). Voluntary participation also supports social behavior, psychological health, and personality traits like openness and emotional stability (Schmitz, 2022b; Schmitz, 2022a).

Program-specific participation profiles are tied to educational outcomes (Arnoldt et al., 2016; Sauerwein et al., 2016), including reading achievement (Bellin and Wegner, 2010). Structured extracurricular programs in reading and science show positive effects on subject-specific competencies, self-regulation, and motivation (Holtappels et al., 2018; Lossen et al., 2016; Schröder, 2021). Even alternative programs, such as organized 'learning time' instead of traditional homework support, enhance student well-being and self-perceived competence (Brisson and Theis, 2020).

The concept of "process quality" represents the views of the students, if activities are engaging, motivating and if they allow for active participation. High process quality leads to improved grades (Kuhn and Fischer, 2011a), goal orientation (Fischer et al., 2011a; Fischer et al., 2009; Fischer et al., 2016), social behavior (Fischer et al., 2011b; Sauerwein et al., 2018; Kuhn et al., 2016), self-esteem and self-efficacy (Sauerwein, 2017; Sauerwein, 2019) and well-being (Fischer et al., 2011a; Fischer and Theis, 2014). For science programs, process quality influences the domain-specific self-concept (Lossen et al., 2016).

Strong relationships between program leaders and students contribute to academic and behavioral benefits, including better grades, goal orientation, and well-being (Kuhn and Fischer, 2011a; Fischer et al., 2011b; Fischer et al., 2011a; Fischer and Theis, 2014). Mentorship programs further demonstrate positive effects on academic performance, such as English achievement (Dohrmann et al., 2021).

#### 1.4.2 Relevant organizational factors leading to effective learning environments

The previous section demonstrated that participation in extended education programs, program/process quality, and the nature of relationships within these programs are critical for achieving positive outcomes. To ensure these elements, effective collaboration among educational staff is paramount. All-day schools bring together

professionals from diverse pedagogical backgrounds, such as teachers and those with expertise in social pedagogy, special education, or even non-pedagogical fields. This diversity necessitates coherent collaboration within multi-professional and inter-institutional teams (Kielblock, 2023b, *Qualitätsdialog Zum Ganzttag*, 2021). To achieve this, designated time for collaboration must be systematically allocated. Empirical studies underline that structured collaboration time is an indispensable prerequisite for effective teamwork (Fussangel, 2013; Meyer, 2020; Beher et al., 2007; Steiner, 2010; Tillmann and Rollett, 2014).

Establishing favorable conditions for collaboration (such as allocated collaboration time) requires robust school management with a clear emphasis on cooperative processes. All-day schools are inherently complex institutions, given their diverse organizational and governance demands. Relying on individual efforts to manage this complexity is neither sustainable nor effective. Instead, a collaborative leadership model is essential, ideally realized through a steering group (Kielblock, 2023a; *Qualitätsdialog Zum Ganzttag*, 2021). Such a steering group should include representatives from all key stakeholder groups, whose composition may vary depending on the specific organizational configuration.

The steering group serves several critical functions. First, it facilitates the establishment of structured collaboration time for educational staff. Second, it enables the articulation and implementation of a coherent vision for the all-day programme, aligning extracurricular and curricular aims. Third, it fosters meaningful curricular-extracurricular synergy, ensuring that academic instruction and extended education programs are cohesively integrated. This approach underscores the importance of well-designed collaborative frameworks, strategic leadership, and intentional alignment of instructional and extracurricular efforts as prerequisites for maximizing the impact of extended education (see also Section 1.3).

## 1.5 Conceptual framework and research questions

### 1.5.1 Conceptual model

The present study utilizes the all-day school effectiveness model, which was developed by Holtappels (2009). The model assumes that contextual aspects (such as policies, infrastructure) have an impact on the quality of the school processes. These comprise the school organization, the concepts, but also the staff. School processes lead to the quality of learning processes of the students, and these result into certain outcomes. The student outcomes are also dependent on the socioeconomic background of the students. The present study is concerned with the quality of the school processes, and the model allows to understand, how this facet is embedded in other factors of schooling.

Research highlights parts of the model (as the literature review pointed out; summarized in Kielblock and Maaz, 2024). Namely: (1) High quality learning processes and positive social relationships lead to positive student outcomes. (2) High quality learning processes depend on positive and collaboration-friendly working conditions of staff and a clear and cohesive overarching concept with a focus on extended education. (3) Shared responsibilities and collaborative school development processes are necessary to providing sufficient



working conditions and concepts. (4) Context and external support services are enabler for (3). This leads to the model proposed by Kielblock (2023a), which is depicted in Figure 1.

The grey part of the model represents the focus of the present study, which is how shared responsibilities and collaborative school development processes might help in providing sufficient working conditions and concepts.

### 1.5.2 Research gap and research questions

While prior research has examined the effects of shared leadership responsibility and collaborative school development on various outcomes, relatively little attention has been given to their comparative impact on organizational quality. Existing studies highlight the benefits of shared leadership responsibility in fostering team effectiveness and strengthening collaborative school cultures, while research on collaborative school development underscores its role in enhancing instructional practices and academic outcomes. However, the extent to which these two constructs contribute differentially to school improvement remains largely unexplored. This gap in the literature limits our understanding of whether they function as complementary or distinct mechanisms in shaping organizational effectiveness. Addressing this question is crucial for refining leadership models and optimizing strategies for school development in complex educational environments.

Accordingly, this study addresses the following research questions: Can (A) shared responsibility, and/or (B) collaborative school development predict the (C) working conditions of staff (facilitated by designated time for cooperation), as well as (D) enhanced conceptual integration of the learning environments (in the form of a clear school vision, and the breadth of overarching pedagogical concepts).

### 1.5.3 Hypotheses

As argued earlier in this study (see Section 1.4), shared leadership structures in all-day schools create the foundation for collaborative school development by engaging representatives from all key stakeholder groups in developmental processes. This collaborative approach fosters an environment in which practical challenges, such as establishing designated collaboration time for staff, can be systematically addressed. Furthermore, it enables the development of broader and more coherent extracurricular aims while promoting stronger curricular-extracurricular synergy. These improvements not only enhance working conditions for staff but also ensure that extended education programs are aligned with the school's overall

pedagogical vision, ultimately maximizing their impact on student outcomes.

As previously highlighted in the research gap, existing literature only partially addresses the specific research problem of this study. While the reviewed studies provide valuable insights into the effects of shared leadership responsibility and collaborative school development, the direct empirical foundation for their impact on working conditions and the conceptual integration of learning environments remains limited. Nevertheless, the existing body of research suggests plausible relationships that serve as a basis for formulating hypotheses.

*H1:* Schools with higher levels of shared leadership responsibility and collaborative school development are expected to allocate more designated time for cooperation among staff, as both foster collaborative work structures and joint decision-making (De Jong et al., 2023; Wahlstrom and Louis, 2008; Hallinger and Heck, 2010).

*H2:* Shared leadership responsibility and collaborative school development are expected to positively predict a clear school vision and the breadth of pedagogical concepts, as both foster collective decision-making, stakeholder engagement, and a shared sense of direction (D'Innocenzo et al., 2014; Pearce, 2004; Wahlstrom and Louis, 2008; De Jong et al., 2023).

*H3:* Collaborative school development is expected to be a stronger predictor of staff working conditions and pedagogical concepts than shared leadership responsibility, as it is more immediate in shaping these outcomes. Moreover, collaborative school development may moderate the relationship between shared leadership responsibility and these outcomes.

## 2 Methods

### 2.1 Sample

This study presents an analysis of data from the Study on the Development of All-Day Schools (StEG; Data doi:10.5159/IQB\_StEG\_Systemmonitoring\_V2). The sample included three types of schools: primary/elementary schools (PRM), typically encompassing grades 1 to 4 (students aged 6–10 years). In two of Germany's sixteen Federal

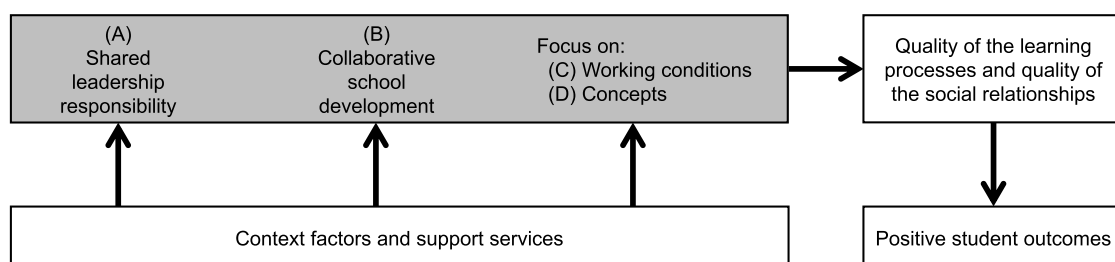


FIGURE 1 Model of collaborative leadership in extended education. This model was originally published in Kielblock (2023a) and is presented here in a modified version.

States, primary schools extend to grade 6 (students aged 6–12 years). Secondary schools were classified into two categories: the Gymnasium (GYM), a selective track with explicit academic orientation, and non-gymnasium secondary schools (SEK), which comprise all other secondary school forms. Representative samples were drawn for each school type. Analyses either treated these school types as distinct samples or, in more complex models, as distinct groups (see Section 2.3 for details).

The sampling process followed an elaborate and rigorous design to ensure representativeness [see [Furthmüller \(2019\)](#) for further details]. The sampling frame consisted of lists of all all-day schools in each Federal State, provided by respective state governments. Schools were randomly selected from these lists.

Prior to data collection, the study instruments and procedures underwent a comprehensive review process required by all sixteen Federal States. Beginning in August 2017, school authorities and data protection offices evaluated all materials. Approval from all States was granted in February 2018, after which sampling and data collection commenced.

A three-stage recruitment process was implemented to maximize participation. Initially, schools were contacted via postal mail with access credentials for an online questionnaire. Approximately two weeks later, non-responding schools received a follow-up email. After three weeks, a second postal reminder was sent to schools that had not yet participated. If no response was received within four weeks, a backup school with similar organizational characteristics was contacted. Throughout the data collection phase, schools were supported via multiple communication channels, including a telephone hotline and email.

The target sample consisted of 1,991 schools (PRM: 735; SEK: 827; GYM: 429). The final sample included 509 primary schools (response rate: 69.3%), 574 non-gymnasium secondary schools (response rate: 69.4%), and 272 Gymnasium schools (response rate: 63.4%). These relatively high response rates were achieved through persistent follow-ups and the use of a multiple-sample design, which included backup schools to replace non-responding institutions, as described above. Consequently, the dataset provides a robust representation of all-day schools in Germany during the 2017/18 school year.

School size varied considerably within the sample, ranging from fewer than 100 to over 1,000 students. On average, primary schools had 224 students, non-gymnasium secondary schools 455 students, and Gymnasium schools 587 students. Further details regarding the sample can be found in [Furthmüller \(2019\)](#).

The survey also explored when the school became an ‘all-day’ school. Some schools reported transitioning to the all-day format as early as the 1960s. The adoption of all-day schooling in Germany surged following the political decision to promote this model in 2002 and the implementation of the Investment Programme for the Future of Education and Childcare (IZBB) policy. Between 2003 and 2009, the IZBB policy facilitated substantial investments in all-day school infrastructure and program development. Researchers (e.g., [Klemm, 2014](#)) argue that this period witnessed the largest expansion of all-day schools in Germany, with the rate of new adoptions slowing thereafter. This trend is corroborated by the data: between 2003 and 2009, 193 primary schools, 203 non-gymnasium secondary schools, and 125 Gymnasium schools transitioned to the all-day model. In contrast, between 2010 and 2016, the numbers dropped to 158, 191, and 96 new all-day schools, respectively.

To collect relevant institutional information, the study surveyed school leaders. Eligible respondents varied by school, hence, participants were asked to identify their roles. In most cases, the principal completed the survey (PRM: 434, 85.3%; SEK: 384, 66.9%; GYM: 152, 55.9%). Other respondents included deputy principals (PRM: 36, 7.1%; SEK: 74, 12.9%; GYM: 36, 13.2%) and designated coordinators for all-day school activities (PRM: 27, 5.3%; SEK: 84, 14.6%; GYM: 75, 27.6%). In a few cases, the respondent indicated an alternative role.

## 2.2 Instruments

### 2.2.1 Data collection method

The data were collected through a standardized questionnaire accessible via a password-protected online portal. Comprising 68 questions, the interactive design of the questionnaire facilitated a user-friendly data collection by tailoring the survey dynamically to participants’ prior responses. This adaptive approach excluded irrelevant items, enhancing both efficiency and relevance. The questionnaire addressed general school characteristics and specific aspects of all-day school operations, including institutional resources, school development practices, the roles of teachers, educational staff, and external cooperation partners, as well as the structure and provision of all-day programs. Additional questions explored diversity within schools, with a particular focus on inclusion and exclusion.

### 2.2.2 Measures

Shared leadership responsibility and collaborative school development are the explaining variables of interest. Collaborative working conditions are measured by the designated time for collaboration. Breadth of extracurricular aims and curricular-extracurricular synergy are both used to measure concepts. These three measures are the explained variables. [Table 1](#) contains all descriptive information regarding the important variables. How these variables were measured is explained in the following paragraphs, and then, the structure of the explained (latent) variables is examined and confirmed.

#### 2.2.2.1 Explaining variable: shared leadership responsibility

School leaders were asked, “Who mainly manages the extended school program at your school?” with eight response options. Four options indicated individual responsibility for managing the program: (1) the school principal and/or deputy principal, (2) the didactic/pedagogical manager or department head, (3) a designated teacher as coordinator, or (4) a member of the school’s pedagogical staff as coordinator. These responses were coded as [0] to indicate the absence of shared leadership responsibility. The other four options reflected shared leadership models: (5) an existing steering group at the school, (6) a specialized committee comprising teachers and pedagogical staff, (7) a coordination committee between the school and external partners, or (8) a committee involving the school and an external sponsor or organization. These responses were coded as [1], signifying shared leadership responsibility.

The data indicate that in most schools, the (deputy) principal has the primary responsibility for managing the extended school program, consistent with German policy emphasizing the principal’s role in this domain ([KMK, 2023b](#)). This pattern is especially pronounced in primary schools (50.8%), compared to non-gymnasium secondary

TABLE 1 Descriptive statistics of the relevant variables.

	PRM		SEK		GYM	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Shared leadership responsibility	107	23.0	98	17.9	52	20.4
Collaborative school development						
1 group involved	25	5.7	36	7.1	20	8.5
2 groups involved	68	15.6	111	22.0	60	25.5
3 groups involved	129	29.7	118	23.4	37	15.7
4 groups involved	108	24.8	109	21.6	65	27.7
5 groups involved	79	18.2	95	18.8	46	19.6
6 groups involved	26	6.0	35	6.9	7	3.0
Designated time for collaboration						
Time for collaboration between teachers	253	61.9	259	55.9	65	15.9
Time for collaboration between other staff	261	63.8	194	41.9	68	16.6
Time for collaboration between teachers and staff	214	52.5	187	40.3	64	15.6
Breadth of extracurricular aims						
Enhancing the learning culture	286	65.6	340	67.5	142	59.4
Fostering competencies and talent development	197	45.2	282	55.8	150	62.8
Community, social learning, and personal development	396	90.6	445	87.9	199	83.3
Curricular-extracurricular synergy						
Focus areas link teaching and extracurricular activities	138	32.9	191	39.5	72	31.0
Learning difficulties addressed through programs	285	67.7	417	86.3	199	85.8
Extracurricular learning deepens topics from lessons	135	32.3	190	39.6	80	34.6
Teaching and other activities are poorly integrated	237	56.8	241	50.0	144	62.6

Dataset StEG 2017/18. For the presentation of the items related to “Breadth of Extracurricular Aims,” the categories “Largely” and “Fully” were combined. For the presentation of the items related to “Curricular-Extracurricular Synergy,” the categories “Somewhat Agree” and “Fully Agree” were merged.

schools (41.2%) and Gymnasium schools (27.8%). In secondary schools, individual teachers often coordinate the extended program (SEK: 20.9%; GYM: 31.0%). Shared leadership models, such as steering groups or committees, are reported in approximately 20% of schools (PRM: 23.0%; SEK: 17.9%; GYM: 20.4%; see Table 1).

### 2.2.2.2 Explaining variable: collaborative school development

School leaders were also asked to what extent various groups were actively involved in their school’s development processes. Respondents rated six stakeholder groups—(1) school principal (team), (2) teachers, (3) other school staff, (4) external staff (from collaborating institutions), (5) parents, and (6) students—on a 4-point scale: “not at all,” “somewhat,” “largely,” and “fully.” Responses of “largely” or “fully” were considered indicators of group involvement. These ratings were aggregated into an index ranging from 1 (non-collaborative) to 6 (fully collaborative), representing the number of groups actively participating in school development.

Descriptive statistics for this index are shown in Table 1. Primary and non-gymnasium secondary schools exhibit similar distributions, with three groups actively involved in school development processes most frequently reported (PRM: 29.7%; SEK: 23.4%). Few schools involve only one group or all six groups. By contrast, Gymnasium schools display a different distribution, with two (25.5%) and four (27.7%) groups being the most common constellations. Full collaboration

involving all six groups is rare across all school types, especially in Gymnasium schools, where it occurs in only 3.0% of the cases.

### 2.2.2.3 Explained latent variable: designated time for collaboration

One latent variable examined is the designated time allocated for collaboration among school staff. School leaders were asked whether specific time was allocated for collaboration (1) among teachers, (2) among other staff, and (3) between teachers and other staff. Responses were binary (yes/no). Descriptive statistics (Table 1) reveal that designated collaboration time is most common in primary schools (52.5–63.8%), less frequent in non-gymnasium secondary schools (40.3–55.9%), and rare in Gymnasium schools (15.9–16.6%). A latent variable was specified to capture the shared variance across these three measures (see further details on confirmatory factor analysis below).

### 2.2.2.4 Explained latent variable: breadth of extracurricular aims

The breadth of extracurricular aims was conceptualized as another latent variable. School leaders were asked to what extent their school’s extended concept incorporated three objectives: (1) enhancing the learning culture, (2) fostering competencies and talent development, and (3) promoting community, social learning, and personal development. These items were rated on a 4-point scale: “not at all” to “completely.” For descriptive purposes (Table 1), responses of “largely”

and “completely” were combined. The latent variable reflects the combined extent to which schools aim to achieve these objectives, with higher values indicating a broader set of extracurricular goals.

### 2.2.2.5 Explained latent variable: curricular-extracurricular synergy

Curricular-extracurricular integration was assessed through the question: “All-day schools enable the conceptual integration of subject teaching and extracurricular learning opportunities. How is this implemented at your school?” Responses were rated on a 4-point Likert scale (“not agree at all” to “fully agree”) for the following items: (1) Development of content-based curricular profiles and priorities that integrate teaching with all-day offerings. (2) Addressing classroom-identified learning problems and deficits through learning support programs or structured study periods. (3) Methodological and substantive links between extracurricular learning and subject teaching that deepen themes and knowledge areas. (4) Poor integration of teaching and extracurricular offerings (negatively worded). Descriptive statistics (Table 1) indicate moderate integration overall. Approximately one-third of schools agree or partially agree that extracurricular activities enhance curricular focus areas or deepen classroom topics. Conversely, 50.0–62.6% of schools report poor integration. The highest agreement concerns addressing classroom learning deficits through extracurricular activities, particularly in secondary schools (SEK: 86.3%; GYM: 85.8%) compared to primary schools (PRM: 67.7%).

### 2.2.2.6 Examination of the structure of the latent variables: parallel analysis

To evaluate the structure of the three explained latent variables—designated time for collaboration, breadth of extracurricular aims, and curricular-extracurricular synergy—Parallel Analysis (Horn, 1965) was conducted. This method compares Eigenvalues from the observed data's correlation matrix with those from randomly generated datasets to determine the number of factors to retain. Retention criteria involve selecting factors whose Eigenvalues exceed those derived from random data.

As shown in Figure 2, the Eigenvalues for the observed data exceeded those of the random data for three dimensions (Empirical data: 3.30, 1.76, 1.12). This result suggests that the ten manifest variables are best represented by three dimensions, supporting the hypothesized structure of the constructs.

### 2.2.2.7 Examination of the structure of the latent variables: multi-group confirmatory factor analysis

Building on the Parallel Analysis findings, a three-factor model was specified to correspond to the latent variables described earlier. Multi-group Confirmatory Factor Analysis (CFA) was performed using the R lavaan package (Rosseel, 2012). Table 2 presents the results. Most standardized loadings exceeded 0.5, indicating that the latent factors strongly explain the manifest variables. Although a few loadings fell below 0.5, all remained above 0.3 and were statistically significant. Notably, the negative loadings of Factor 3 on the item “Teaching and other activities are poorly integrated” align with the item's negative phrasing.

The model demonstrated good fit based on established cut-off criteria (Weiber and Mühlhaus, 2010; Kielblock, 2024). High goodness-of-fit indices (CFI = 0.951; TLI = 0.931) and low badness-of-fit indices [RMSEA = 0.060 (0.050, 0.069); SRMR = 0.052] indicate that the hypothesized structure fits the data well. These results confirm that the ten manifest variables are adequately captured by three latent constructs: (1) designated time for collaboration, (2) breadth of extracurricular aims, and (3) curricular-extracurricular synergy.

## 2.3 Analytic strategy

The analytic strategy comprises three steps to explore the relationships between shared leadership responsibility, collaborative school development, and their effects on working conditions and conceptual frameworks.

### 2.3.1 Step 1: Individual predictive analyses

In the first step, the relevance of the two explanatory variables—shared leadership responsibility and collaborative school

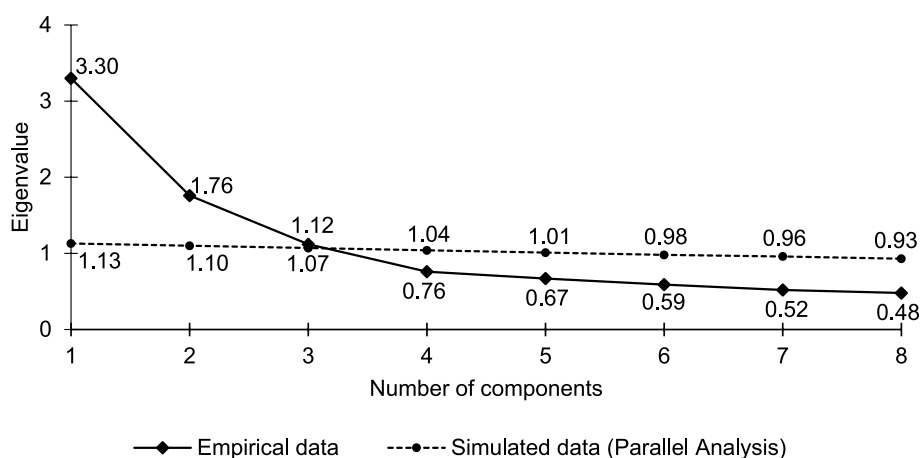


FIGURE 2  
Parallel analysis of the indicators of the explained constructs.



development—as predictors of the three latent variables is examined. Specifically, shared leadership responsibility and collaborative school development are individually tested as predictors for designated time for collaboration, breadth of extracurricular aims and curricular-extracurricular synergy. Analyses are conducted separately for each explanatory-explained variable pairing, resulting in six models. The results identify which of the explanatory variables serves as a particularly strong predictor for each latent outcome.

### 2.3.2 Step 2: Moderation models

Building on the results from Step 1, Step 2 investigates whether the relationship between shared leadership responsibility and the working conditions and concepts (designated time for collaboration, breadth of extracurricular aims, and curricular-extracurricular synergy) is mediated by collaborative school development. This involves testing mediation models for each of the three explained variables. The paths are specified according to the model in Figure 3. In this step, particular attention is given to the indirect effect ( $ab$ ), representing the potential mediated pathway from shared leadership responsibility through collaborative school development to the working conditions and concepts. The total effect ( $abc$ ) is also calculated to determine the combined direct and indirect effects.

### 2.3.3 Step 3: Combined model

The third step integrates the findings into a unified structural equation model (SEM) to simultaneously estimate all relationships among the five variables. This comprehensive model assesses whether the relationships observed in the individual analyses persist when all paths are estimated together. The estimated model is depicted in Figure 4.

### 2.3.4 Analytical approach

All analyses were conducted using the lavaan package in R version 0.6–19 (Rosseel, 2012). As the explained variables are latent constructs, the SEM methodology was applied. Given the stratified sampling strategy across the three school forms, multi-group SEM was employed using the “group=” function in lavaan to account for school-type differences. Although the hierarchical structure of the data could suggest potential clustering effects, tests using Cluster Robust Standard Errors showed no deviations in significance patterns. Consequently, only the multi-group results are reported, as they address the primary clustering concerns inherent in the stratified design. Missing values were addressed using Full Information Maximum Likelihood (FIML) estimation to ensure robust parameter estimates. All coefficients are reported in standardized form (std.all).

## 3 Results

### 3.1 Relevant predictors of working conditions and concepts

In the initial phase of the analysis, it was examined whether shared leadership responsibility and collaborative school development significantly predict key aspects of working conditions and concepts. Six regression models were estimated, employing either shared leadership responsibility or collaborative school development as the independent variable. The dependent variables included designated

time for collaboration, the breadth of extracurricular aims, and the integration of curricular and extracurricular activities.

As presented in Table 3, shared leadership responsibility emerged as a significant predictor for designated time for collaboration [ $\beta_{(PRM)} = 0.138^*$ ;  $\beta_{(SEK)} = 0.115^*$ ;  $\beta_{(GYM)} = 0.263^*$ ]. Notably, the standardized coefficient was particularly pronounced for Gymnasium schools compared to the other two school types. This finding indicates that the relationship between shared leadership responsibility and the allocation of designated collaboration time is strongest in Gymnasium schools, although it remains significant across all school forms. Additionally, shared leadership responsibility was significantly associated with a greater breadth of extracurricular aims in secondary schools. However, no other significant associations were identified with respect to shared leadership responsibility.

Table 3 also demonstrates that collaborative school development is significantly associated with all three variables representing working conditions and concepts. Regression analyses reveal that schools characterized by more collaborative development approaches tend to allocate greater time for collaboration, exhibit a broader range of extracurricular aims, and achieve stronger integration between curricular and extracurricular activities. Most regression coefficients were approximately 0.3. An exception was the relationship between collaborative school development and designated time for collaboration in Gymnasium schools, where the coefficient was lower than in other contexts but remained statistically significant at the 5% level.

### 3.2 Relative position of responsibility and development

To examine the relative influence of shared leadership responsibility and collaborative school development, the potential mediating role of collaborative school development was analyzed in the second stage of the study. The results of three (multi-group) mediation models are summarized in Table 4.

In all three models, path  $b$  is significant, confirming that collaborative school development is a strong predictor of the three outcome variables: designated time for collaboration, the breadth of extracurricular aims, and curricular-extracurricular synergy. These findings are consistent with the results reported in Section 3.1.

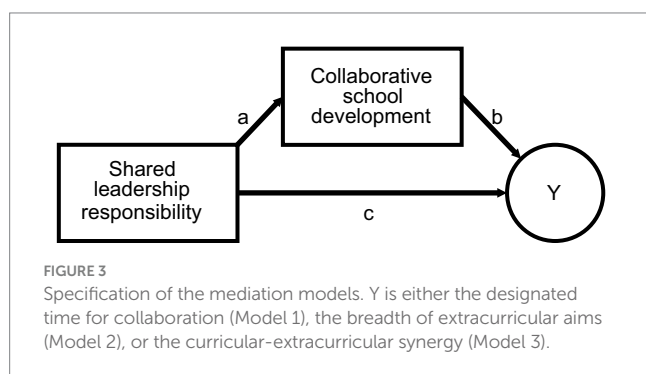
Path  $c$ , representing the direct effect of shared leadership responsibility on the outcome variables, is significant only for designated time for collaboration. Across all school types, schools implementing shared leadership responsibility are more likely to allocate designated time for collaboration. This result reinforces the conclusions from Section 3.1, which indicated a similar pattern. However, in non-Gymnasium secondary schools, the breadth of extracurricular aims is not significantly predicted by shared leadership responsibility, diverging from the trends observed in Section 3.1. Specifically, in Model 2, path  $c$  is not significant for non-Gymnasium secondary schools (see Table 4). None of the other direct effects were found to be significant.

The core focus of the mediation analysis is the indirect effect ( $ab$ ), which would indicate whether collaborative school development mediates the relationship between shared leadership responsibility and the outcome variables. If a mediation effect were present, this would imply that shared leadership responsibility influences collaborative school development, which in turn affects the outcome

TABLE 2 Confirmatory factor analysis.

	PRM	SEK	GYM
<b>f1 Designated time for collaboration</b>			
Time for collaboration between teacher	0.571	0.502	0.455
Time for collaboration between other staff	0.710	0.581	0.764
Time for collaboration between teachers and staff	0.705	0.758	0.584
<b>f2 Breadth of extracurricular aims</b>			
Enhancing the learning culture	0.867	0.789	0.814
Fostering competencies and talent development	0.742	0.689	0.696
Community, social learning, and personal development	0.552	0.606	0.521
<b>f3 Curricular-extracurricular synergy</b>			
Curricular profiles link teaching and extracurricular activities	0.726	0.626	0.760
Learning difficulties are addressed through support programs	0.554	0.429	0.332
Extracurricular learning deepens topics from lessons	0.800	0.785	0.844
Teaching and other activities are poorly integrated	-0.660	-0.529	-0.647
<b>Covariances</b>			
f1 with f2	0.190	0.212	0.171
f1 with f3	0.345	0.281	-0.033
f2 with f3	0.710	0.582	0.696

$n_{(PRM)} = 452$ ;  $n_{(SEK)} = 523$ ;  $n_{(GYM)} = 244$ ; CFI = 0.951; TLI = 931; RMSEA = 0.060 [0.050, 0.069]; SRMR = 0.052.



variables. However, no significant mediation effect was identified across the three models (see *ab* in Table 4). Although a significant total effect was observed in Model 1, this does not alter the conclusion that collaborative school development does not mediate the relationship between shared leadership responsibility and the outcome variables.

Obviously, shared leadership responsibility serves not as a foundation for collaborative school development. Accordingly, based on the results of the mediation analyses, the overall model in the next section treats shared leadership responsibility and collaborative school development as correlated constructs. This approach assumes their impacts on the outcome variables to be of equal importance, rather than one construct mediating the other.

### 3.3 Overall model

The overall model was specified in accordance with the framework described in Section 2.3 (see Figure 4). Model fit was assessed as the first step in the analysis. The goodness-of-fit indices (CFI = 0.946;

TLI = 0.922) indicate a good fit, while the low badness-of-fit indices (RMSEA = 0.053 [0.045, 0.061]; SRMR = 0.048) further underline the adequacy of the model. Table 5 presents the results of the multi-group structural equation model, including standardized estimates for regression paths, correlations, and *p*-values for each group.

A consistent pattern emerges regarding collaborative school development, which serves as a significant predictor for all three outcome variables. The standardized regression coefficients are significant at the 0.1% level across all groups, with one exception: the regression of collaborative school development on designated time for collaboration is significant at the 5% level. This aligns with findings reported in earlier sections. In this analysis, the effect persisted to be significant even in a more complex model incorporating more variables.

In contrast, the effect of shared leadership responsibility on designated time for collaboration, which was prominent in earlier results, is slightly less robust in this model. Significant effects are observed only for primary and Gymnasium schools, where the coefficients reach significance at the 5% level. For non-Gymnasium secondary schools, the coefficient misses significance ( $p = 0.054$ ). Under a 10% significance threshold, this effect would be considered significant. Nevertheless, the interpretation that shared leadership responsibility predicts designated collaboration time across all school types should be approached cautiously, given that significance is limited to primary and Gymnasium schools.

The overall structural equation model also facilitates analysis of covariances among the variables. Notably, no significant correlation was identified between shared leadership responsibility and collaborative school development. Similarly, the correlation between designated time for collaboration and the breadth of extracurricular aims was non-significant across all school groups.

However, significant correlations were observed in specific contexts. In primary and non-Gymnasium secondary schools, a

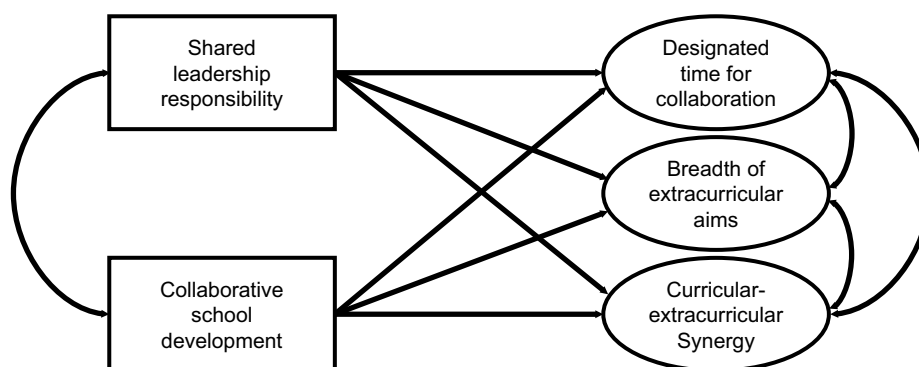


FIGURE 4

Specification of the overall structural equation model. The three latent variables are specified as described in Section 2.2.2. The full model is calculated as a multi-group structural equation model, where the group-variable is the school form. Hence, fit statistics apply to the full model, while estimates are given for each school group separately.

TABLE 3 Relevant predictors of the working conditions and concepts.

Model	Primary	Secondary	Gymnasium
Shared leadership responsibility →			
(1) Designated time for collaboration	0.138*	0.115*	0.263**
(2) Breadth of extracurricular aims	-0.045	0.109*	0.045
(3) Curricular-extracurricular synergy	0.014	0.024	0.013
Collaborative school development →			
(4) Designated time for collaboration	0.296***	0.272***	0.220*
(5) Breadth of extracurricular aims	0.329***	0.296***	0.379***
(6) Curricular-extracurricular synergy	0.397***	0.275***	0.342***

Each of the six models is one independent manifest variable as predictor of one dependent latent variable (see Methods for more details). \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

significant association exists between designated time for collaboration and curricular-extracurricular synergy. Across all school types, a strong correlation was found between the breadth of extracurricular aims and curricular-extracurricular synergy. This is theoretically consistent, as both constructs reflect the concepts which are implemented.

## 4 Discussion

### 4.1 Interpretation

In Section 3.1, two primary findings were identified. First, collaborative school development emerged as a significant predictor for all relevant outcome variables across all three school types. Second, shared leadership responsibility was shown to be a significant predictor of designated time for collaboration across all school forms.

In Section 3.2, the analyses examined the mediating role of collaborative school development but found no evidence of a mediation effect. However, the mediation models reinforced two critical direct effects: collaborative school development significantly predicted all outcome variables, and shared leadership responsibility directly influenced designated time for collaboration. These findings corroborate the results from Section 3.1. Furthermore, the mediation models demonstrated that shared leadership responsibility does not account for collaborative school development. This indicates that the

type of leadership responsibility operates independently from the extent to which school development processes engage broader stakeholder involvement.

In Section 3.3, a comprehensive model incorporating all variables examined in the study was estimated. This full model confirmed the consistent and significant impact of collaborative school development on all outcome variables—a robust finding throughout all stages of analysis. However, the effect of shared leadership responsibility on designated time for collaboration was significant only in primary and Gymnasium schools within the context of this larger model. The earlier result showing the independence of shared leadership responsibility and collaborative school development was also underlined by this analysis.

An additional noteworthy finding emerged from the full model: in primary and non-Gymnasium secondary schools, designated time for collaboration was significantly correlated with the conceptual integration of curricular and extracurricular activities. This highlights the nuanced ways in which collaboration time may support broader conceptual alignment in these school types.

These findings provide partial support for the proposed hypotheses. H1 was confirmed, as both shared leadership responsibility and collaborative school development consistently predicted designated time for collaboration. H2 received only partial support, as breadth of extracurricular aims and curricular-extracurricular synergy were predicted solely by collaborative school development. H3 was also only partially supported: while collaborative

TABLE 4 Mediation models.

Y	Model 1			Model 2			Model 3		
	Designated time for collaboration			Breadth of extracurricular aims			Curricular-extracurricular synergy		
	PRM	SEK	GYM	PRM	SEK	GYM	PRM	SEK	GYM
a	0.052	0.044	0.047	0.054	0.046	0.049	0.054	0.046	0.049
b	0.237***	0.263***	0.300***	0.291***	0.363***	0.320***	0.316***	0.367***	0.295***
c	0.141***	0.133***	0.162***	0.019	0.020	0.019	0.005	0.004	0.004
ab	0.012			0.016			0.017		
Total	0.153***			0.035			0.022		

$n_{(PRM)} = 465$ ;  $n_{(SEK)} = 549$ ;  $n_{(GYM)} = 255$ ; (a) shared leadership responsibility  $\rightarrow$  collaborative school development; (b) collaborative school development  $\rightarrow$  Y; (c) shared leadership responsibility  $\rightarrow$  Y (see Methods for more details). \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

school development demonstrated a substantially stronger predictive power than shared leadership responsibility, moderation analyses did not indicate a significant moderating effect.

#### 4.1.1 The importance of collaborative school development

Taken together, the results suggest that leadership is not just about shared responsibility but especially about collaborative school development. This resonates with [Spillane et al. \(2001\)](#) that leadership is framed as a practice shaped by interactions among leaders, followers, and the school environment, highlighting that leadership practices directly influence school improvement through dynamic exchanges. Similarly, it was emphasized by [Harris \(2008\)](#) that leadership is the interplay between vertical and lateral processes, and [Mayrowetz \(2008\)](#) argued that leadership needs to be understood in relation to school improvement. This is foundational for fostering collective school development rather than merely delegating and negotiating responsibilities. In this way, other studies also linked stronger distributed leadership practices to better schooling, which is showcasing how leadership drives collective development goals ([De Jong et al., 2023](#); [Hallinger and Heck, 2010](#); [Wahlstrom and Louis, 2008](#)). The current study underlines that leadership extends beyond the mere shared responsibility and instead actively facilitates collaborative processes that shape organizational development.

While the stronger predictive power of collaborative school development compared to shared leadership responsibility is a key finding, this does not necessarily imply that shared leadership is ineffective. Rather, it highlights an important conceptual distinction: Shared leadership responsibility refers to the distribution of management roles, whereas collaborative school development captures the extent of active stakeholder participation in shaping all-day school processes. The mere delegation of leadership responsibilities does not automatically foster meaningful collaboration. In contrast, collaborative school development reflects an embedded culture of joint decision-making and engagement, making it more directly relevant to school improvement efforts.

#### 4.1.2 Shared responsibility and collaborative school development are independent

It would have been reasonable to assume that clarifying responsibilities would serve as the foundation for collaborative school development. However, the findings indicate that these two aspects are unrelated. The assumption that clarifying responsibilities is

sufficient (as, for example, the policy of the [KMK, 2023b](#) states) proves to be an oversimplification. The present results suggest that it is essential for the all-day school team to drive collaborative school development forward. Therefore, it can be argued that “development outweighs responsibility” in fostering high quality organization in extended education.

#### 4.1.3 Shared leadership responsibility as a factor for allocated collaboration time

Shared responsibility for leadership is not as important as collaborative school development, yet it seems to be central at least for providing a distinct time frame, which is reserved for staff collaboration. Research on multi-professional collaboration underscores the importance of opportunities for collaboration, with interview studies highlighting that participants consider allocated time for cooperation as a critical condition for success ([Fussangel, 2013](#); [Meyer, 2020](#)), and this time is especially given, when team members have longer weekly working hours, which are often associated with more intensive and frequent collaboration ([Beher et al., 2007](#); [Steiner, 2010](#); [Tillmann and Rollett, 2014](#)). Thus, it is plausible to argue that the allocation of time for collaboration becomes less meaningful when significant portions of the staff are employed on an hourly basis, as they may not be able to fully utilize the allocated time. This issue, however, may be particularly addressed through leadership practices, especially when shared responsibility is implemented. In such cases, the relationship between shared leadership and the allocation of collaboration time can be explained, as the collaborative nature of leadership responsibility can facilitate both, adequate contracts, including enhanced amount of working time, and also specific time for collective engagement among staff.

#### 4.1.4 Collaboration time is correlated with curricular-extracurricular synergy

At least for primary schools and non-gymnasium secondary schools, it has been shown that allocated collaboration time correlates with curricular-extracurricular synergy. More specifically, this means that at all-day school locations where time for collaboration is explicitly provided, there is a stronger integration of classroom teaching and extracurricular activities. This finding can be interpreted in various ways, as causal conclusions cannot be drawn from the cross-sectional research design. On the one hand, the curricular-extracurricular synergy could necessitate the need for collaboration, thereby prompting the introduction of collaboration time. On the



TABLE 5 Overall structural equation model.

	PRM		SEK		GYM	
	Est.	<i>p</i>	Est.	<i>p</i>	Est.	<i>p</i>
<b>Regressions</b>						
Shared leadership responsibility →						
Designated time for collaboration	0.116	0.040	0.104	0.054	0.249	0.006
Breadth of extracurricular aims	−0.062	0.226	0.086	0.080	0.025	0.733
Curricular-extracurricular synergy	0.002	0.969	0.007	0.895	0.007	0.923
Collaborative school development →						
Designated time for collaboration	0.306	0.000	0.264	0.000	0.242	0.011
Breadth of extracurricular aims	0.336	0.000	0.287	0.000	0.384	0.000
Curricular-extracurricular synergy	0.405	0.000	0.288	0.000	0.337	0.000
<b>Covariances</b>						
Shared leadership responsibility --						
Collaborative school development	0.046	0.340	0.062	0.159	0.022	0.742
Curricular-extracurricular synergy --						
Designated time for collaboration	0.263	0.001	0.220	0.004	−0.133	0.201
Breadth of extracurricular aims	0.670	0.000	0.553	0.000	0.649	0.000
Designated time for collaboration --						
Breadth of extracurricular aims	0.112	0.119	0.126	0.078	0.079	0.476

Estimates (Est.) are standardized coefficients. See Section 2.3 for more information regarding details of the multi-group structural equation model.

other hand, the allocated collaboration time itself may be utilized in ways that further enable and enhance curricular-extracurricular synergy. In fact, if both factors are present, it could indicate the overall developmental stage of the all-day school (Holtappels and Rollett, 2009). Regardless of the direction of the effect, it can be concluded that the findings support the idea that staff collaboration time and curricular-extracurricular integration must go hand in hand—without such coordination, the integration of curricula and extracurricular activities (Haenisch, 2009) is difficult to imagine.

## 4.2 Limitations

Despite the robust analysis presented in this study, several limitations in the research design should be considered when interpreting the findings. Firstly, the data represent the state of all-day schools in Germany during the 2017/2018 school year. While this means they do not reflect the current situation in Germany, they nonetheless offer substantial analytical potential. The findings can help identify relationships and patterns that are likely still relevant today—and extend beyond the German context.

One key limitation is the cross-sectional nature of the data, which prevents the establishment of causal relationships between shared leadership responsibility, collaborative school development, and the outcomes of interest. Although mediation and moderation models were used to examine the pathways between variables, these statistical techniques can only suggest associations, not causality. Future longitudinal studies or experimental designs would be beneficial to establish more definitive causal links.

The data were collected using self-reported responses from school leaders. While the use of a structured questionnaire can

provide valuable insights into participants' perceptions, self-reporting can introduce biases, such as social desirability bias or response bias, which may affect the accuracy of the data. Future studies could include additional data sources to triangulate findings and increase the reliability of the results.

While the analysis accounts of school type differences, there may be other confounding factors that influence the relationships between the variables of interest. Further factors might be introduced in future research to control for potential further influences (such as institutional culture, individual leadership styles, or local policy constraints). Qualitative studies (interviews or case studies with school leaders) might offer a more nuanced understanding of how leadership structures translate into meaningful collaboration and school improvement.

## 4.3 Implications

Overall, the present analysis provides important insights into collaborative forms of responsibility and school development, and how they relate to relevant aspects of all-day schooling. The study and its findings are not only relevant to the German context but use the German context to study the broader phenomenon of effective leadership for quality in extended education.

The findings highlight that collaborative organizational development should be prioritized over clarifying leadership responsibilities. While shared leadership responsibility is important for allocating time for collaboration, impact comes from fostering a collaborative development-oriented spirit. Providers of extended education should create opportunities for participation in leadership tasks for all staff. Encouraging collaborative organizational

developments will likely enhance both the quality and the effectiveness of extended education programs. Similarly, from a policy perspective, the study suggests that educational policies should emphasize the importance of supporting organizations in developing collaborative developmental practices rather than just focusing on the allocation of formal responsibilities.

To conclude, this study underscores a vital insight: true organizational improvement in extended education settings is driven not by the mere allocation of shared leadership responsibility, but by the dynamic force of collaborative organizational development. The findings illuminate the profound impact of fostering a culture of collaboration and ensuring the participation of all stakeholders in shaping collective progress. While the data stem from the context of German all-day schools, the insights extend to diverse settings in extended education, emphasizing that enhancing staff working conditions and developing meaningful educational concepts are universal drivers of quality. This research calls for a reimagining of leadership in extended education—one that places collaboration at the heart of progress and transformation. The path forward is clear: to build stronger, more innovative leadership practices in extended education, we must invest in the power of collaboration of all at every level.

## Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found at: doi: [https://doi.org/10.5159/IQB\\_StEG\\_Systemmonitoring\\_V2](https://doi.org/10.5159/IQB_StEG_Systemmonitoring_V2).

## Ethics statement

The studies involving humans were approved by the school authorities and data protection offices in all sixteen Federal States. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

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## Author contributions

SK: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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## Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Generative AI statement

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