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Organizational resilience and transformational leadership for managing complex school systems

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Introduction: In the context of global challenges facing educational institutions, this study explores the dynamics between transformational leadership, collective teacher efficacy, and organizational resilience in school systems. Specifically, it examines the mediating role of collective teacher efficacy in the relationship between middle leaders' transformational leadership and organizational resilience.

Methods: The study involved data collection from 103 middle-leaders and 506 randomly selected secondary school teachers across Israel. Structural equation modeling was used to analyze the data, focusing on the mediating role of collective teacher efficacy in the relationship between transformational leadership and organizational resilience.

Results: The analysis revealed that collective teacher efficacy fully mediates the relationship between middle-leaders' transformational leadership and organizational resilience. Middle-leaders' transformational leadership positively impacts collective teacher efficacy, which in turn enhances organizational resilience. The study's findings suggest that educational institutions can significantly increase their organizational resilience by fostering transformational leadership and strengthening collective teacher efficacy.

Discussion: The implications of these findings are both theoretical and practical. Theoretically, the study expands the understanding of the interplay between leadership styles and organizational resilience in educational settings. Practically, it provides insights for educational policymakers and practitioners aiming to enhance the resilience of schools by promoting transformational leadership and collective teacher efficacy.

KEYWORDS

organizational resilience, collective teacher efficacy, middle-leaders, transformational leadership, schools

1 Introduction

In an increasingly complex global education landscape characterized by rapid technological advances, shifting social dynamics, political reform, and unprecedented disruptions such as the COVID-19 pandemic, organizational resilience (OR) in schools has become an indispensable factor (Levey and Levey, 2019; Yuan and Huang, 2021). OR is the capability of a school to pre-empt, gear up for, tackle, and adapt to both gradual changes and unexpected challenges critical to ensuring the continuity of educational processes, protecting the

well-being of students and teachers, and ensuring the continued advancement of student academic achievement (Limon et al., 2021; McLeod and Dulsky, 2021). As a catalyst for adaptability, recovery, learning, and innovation, OR can promote the development of improved educational practices and structures. Accordingly, this investigation is concentrated on the antecedents leading to OR. Specifically, the present study proposes to investigate the mediating role of collective teacher efficacy (CTE) on the link between middle-leaders' transformational leadership (TL) and organizational resilience (OR).

During the current dynamically shifting educational milieu, developing OR in schools is paramount, given the complex challenges they face. Open, clear, and consistent communication within schools engenders an ethos of trust and collaborative synergy, facilitating a harmonized approach toward challenges (Page et al., 2019). In tandem, creating an innovative environment helps schools address immediate concerns and anticipate future hurdles (Miller et al., 2023). Schools accentuating mental, emotional, and physical well-being invariably nurture communities that are engaged and resilient in response to challenging circumstances (Hymel et al., 2018).

Leadership plays a pivotal role in enhancing OR. According to Itani and Freiha (2022), leaders with strategic vision are crucial for guiding schools through multifaceted challenges. Such leaders can ensure that schools not only navigate disruptions but also capitalize on them, fostering adaptability and continuous improvement (Hermans, 2021; Chen-Levi et al., 2024). The roles and dynamics of leadership bear significant implications for OR in educational institutions (Prestiadi et al., 2020; Odeh et al., 2021). The perception of transformational leadership (TL) is a highly investigated theme within educational research (Bush, 2018; Berkovich and Hassan, 2023). In the educational context, TL involves the leader guiding the follower transcending short-term personal interests, and emphasizing teamwork in an environment where employees are more professional and hierarchies are flatter than in other circumstances (Moreno-Casado et al., 2022; Rechsteiner et al., 2022). TL is characterized as a leadership style predicated on emotional attachment, partnership, and motivational stimulation (Sosik and Jung, 2018). According to Leithwood (2016), TL is especially suitable in response to the challenges arising from the complex nature of education in the 21st century, a period in which educational systems are often subject to significant reform and restructuring.

In the evolving landscape of educational leadership, the role of middle-leaders in schools has become increasingly pivotal (Benoliel, 2020, 2021). Middle-leaders, often referred to as department heads, grade-level leaders, or subject coordinators, are recognized as those who hold positions of leadership between the senior leadership team and the teaching staff (Harris and Jones, 2020). They play a critical role in bridging the gap between strategic decision-making and classroom practice. Middle-leaders are instrumental in implementing school policies, fostering professional development, and driving curriculum and instructional innovations (De Nobile, 2018). Their position enables them to influence both the organizational structure and the pedagogical heart of the school (Leithwood, 2016). Middle-leaders are increasingly seen as key agents in fostering OR. Their transformational leadership (TL) style, characterized by the ability to inspire, motivate, and stimulate teachers, is crucial in building a resilient educational environment (Edwards-Groves et al., 2016).

This study aims to examine the mediating role of CTE regarding the connection between middle-leaders' (those positioned between senior administrators and frontline educators) transformational leadership (TL) and the organizational resilience (OR) of the school. More specifically, we posit that CTE, characterized as "a group's shared belief in its conjoint capabilities to organize and execute courses of action required to produce given levels of attainments" (Bandura, 1993, 1997, p. 477), is a critical mediating variable facilitating the nuanced connection between middle-leaders' TL and OR in educational settings (Figure 1).

The potential contributions of this study are as follows. First, the study investigates the complex interplay between middle-leaders' TL, CTE, and the school's OR. By highlighting the mediating role of CTE, the study provides practical strategies for school middle-leaders to strengthen OR. Understanding these interrelationships is necessary for enhancing not just operational efficiency but also the adaptive capabilities of educational institutions in an increasingly complex and uncertain environment (Dadon-Golan et al., 2019). Second, the study may generate valuable knowledge that can inform policymaking, educational reform, and leadership training programs to facilitate the development of more resilient and adaptive educational systems in response to global and local challenges (Schechter and Ganon-Shilon, 2015).

2 Theoretical background and hypotheses

Organizational resilience (OR) in educational settings, particularly in schools, has garnered significant attention in recent years. This interest is driven by a growing recognition of the challenges schools face in rapidly changing and often unpredictable environments (Boberg and Bourgeois, 2016; Liu et al., 2020). A key aspect of this discourse is the exploration of the mediating role of CTE in the relationship between middle leaders' transformational leadership (TL) and organizational resilience. This literature review synthesizes findings from various studies to provide an understanding of these dynamics.

2.1 Promoting school organizational resilience

Organizational resilience (OR) is the capability of an organization to anticipate, absorb, respond to, and recover from disruptive events or shocks, such as natural disasters, economic downturns, technological failures, or social crises, both reactively and proactively. It involves increasing the capacity for self-organization and learning (Duchek, 2020). It encompasses adaptability, flexibility, redundancy, and robustness, which are critical in managing adversity or turbulence (Hillmann and Guenther, 2021). OR is not limited to the individual level but involves collective levels such as teams and organizational units. Resilience is an emergent property of complex adaptive systems and involves not only standing shocks but also adapting and transforming through the emergence of new structures and processes (Netolicky, 2020). Resilience at the organizational level is derived from specific capabilities, routines, practices, and processes that enable the organization to orient itself, move forward, and create a diverse and

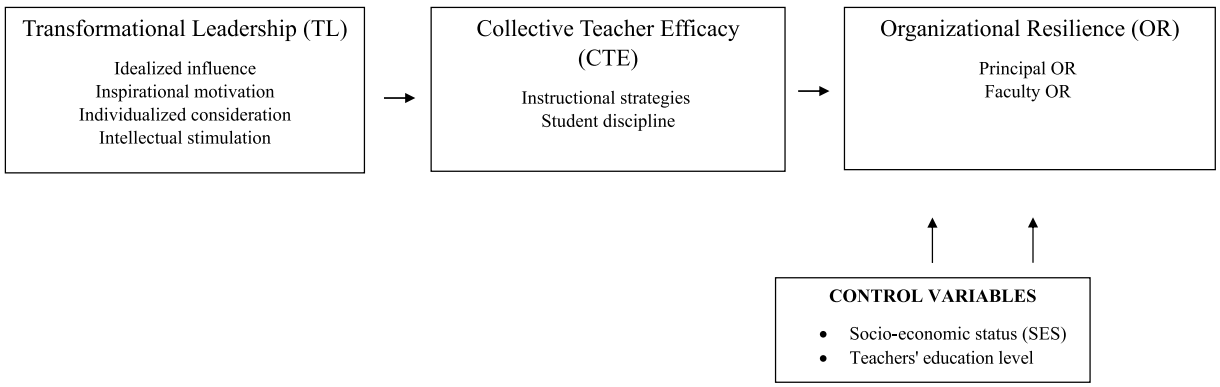

FIGURE 1
Proposed research model: the mediating role of collective teacher efficacy in the relationship between middle-leaders' transformational leadership and organizational resilience.

adaptable environment (Hillmann and Guenther, 2021). Individual resilience is also crucial for OR, as the organization can only be as resilient as its individuals (Mokline and Ben Abdallah, 2021). However, having too many resilient individuals can hinder the development of a shared vision necessary for resilience. Therefore, resilience is manifested through collective actions and decisions (Barasa et al., 2018).

The OR has increasingly been recognized as a vital component in the management of educational systems, especially in the rapidly changing landscapes of schools. The term, as defined by Vogus and Sutcliffe (2007), pertains to the ability to maintain positive adjustment in response to challenging situations, thereby resulting in organizations that are not merely robust but also strengthened. This becomes particularly salient in the context of schools, where dynamic environments necessitate quick and flexible responses to abnormal or challenging conditions (Ping and Jiazhe, 2021; Ma et al., 2022). OR can be seen in the ability of the school to maintain positive adjustment under challenging circumstances and to adapt and transform in the face of challenges. This can involve the development of new structures, such as policies and processes, which enable the school to continue functioning effectively despite disruptions (Netolicky, 2020).

In unpacking the complex construct of OR in school systems, three key elements emerge: the operation of dynamic environments, the reconfiguration of resources in response to crises, and the ultimate recovery and growth post-crisis (Shah et al., 2020; Yuan and Huang, 2021). Operating in dynamic environments involves the capacity of the school's principal and faculty to adapt and respond to external pressures and internal shifts with agility. The literature suggests that such dynamic operations are crucial for the effective management of an unpredictable educational ecosystem (Daly et al., 2020). The second element, responding to crises by reconfiguring resources, emphasizes the strategic allocation and realignment of both tangible and intangible assets. This can include financial resources, human capital, or informational assets. Effective reconfiguration enables the school's principal and faculty to not only weather adverse situations but also gain strategic advantages, perhaps turning crises into opportunities for improvement (Kiryowa, 2021; Hepfer and Lawrence, 2022). The third and final element, achieving recovery and growth, underscores the importance of resiliency not just as a reactive measure but also as a proactive strategy. Here, resilience entails more than just the ability to bounce back; it involves a trajectory of growth and the optimization of processes and relationships for the long term. Principals and faculty should not only aim for recovery but should also seize these moments to innovate and improve, thereby enhancing their resilience for future challenges (Shah et al., 2020; Yuan and Huang, 2021). Furthermore, to enhance OR in schools, it is necessary to develop a comprehensive framework that integrates various dimensions of resilience, such as leadership, governance, culture, infrastructure, and stakeholder engagement (Barasa et al., 2018). This framework should be based on a thorough analysis of the school's strengths, weaknesses, opportunities, and threats, as well as the external and internal factors that affect its resilience. Moreover, it should involve a participatory and collaborative approach that engages all stakeholders, including teachers, students, parents, administrators, policymakers, and community members (Sawyer et al., 2023).

In educational systems, OR is particularly relevant due to the increasing complexity and uncertainty of the educational landscape. The COVID-19 pandemic has highlighted the importance of OR in the education sector, as schools have had to rapidly adapt to new modes of teaching and learning to ensure continuity of education (Sawyer et al., 2023). Schools face various challenges, such as changing student demographics, evolving curricula, budget constraints, teacher shortages, and safety concerns (Ping and Jiazhe, 2021; Ma et al., 2022). These challenges require schools to be resilient and agile in adapting to new demands and opportunities.

This research aligns with the framework proposed by Weick and Sutcliffe (2001, 2015), which examines (OR) through the lens of highly reliable organizations and broadens its applicability across various organizational contexts. Following this framework, Vogus and Sutcliffe (2007) articulated OR as an organization's capability to positively adapt to adversity, enabling it to emerge more robust and adept post-challenge. Such "adversity" encompasses a range of issues including but not limited to mistakes, controversies, emergencies, sudden setbacks, and routine disturbances, alongside continuous threats like competitive pressures, tensions, and burdens. OR transcends mere adaptation, suggesting that resilience during one timeframe enhances the likelihood of sustained resilient operations in subsequent periods. "Being a resilient organization entails maintaining a proactive stance and alertness to potential crises, necessitating an elevation in the

organization's overall capabilities, such as the broad capacity for investigation, learning, and operation without prior knowledge of the specific reasons for action" (Wildavsky, 1991; Vogus and Sutcliffe, 2007 p. 3418). This process facilitates insight without the necessity for structured learning initiatives, as resilient organizations cultivate a culture of continuous learning and adaptation through their day-to-day operations, where employees are encouraged to question assumptions, experiment, and share knowledge organically (Lengnick-Hall et al., 2011). For instance, learning can occur through informal channels like mentorship, self-directed exploration, experiential learning, and peer collaboration. These avenues offer opportunities for insights and growth outside of formally structured programs. Nevertheless, organizations committed to deliberate learning endeavors, exploring a wide array of unforeseen and potential future situations to devise relevant solutions (sensemaking), are poised to broaden their response spectrum, thereby enhancing adaptability, and fostering OR (Weick and Sutcliffe, 2001; Vogus and Sutcliffe, 2007).

The concept of organizational mindfulness and its formulation process are pivotal to OR (Williams et al., 2017). Organizational mindfulness is crucial for grasping how organizations sustain positive adjustment amidst challenging scenarios. This involves an organization's proactive approach to unforeseen events, eschewing oversimplification, diligent operational monitoring, swift recovery from errors, and prioritizing expert-driven decision-making during crises. This perspective was incorporated into our research and another investigation conducted within the Israeli educational framework (Shani, 2020), which identifies organizational mindfulness as a key indicator of organizational resilience (Weick and Sutcliffe, 2001, 2015; Vogus and Sutcliffe, 2007), particularly in assessing the resilience of educational institutions (Hoy et al., 2006; Shani, 2020). In the present study OR involves principal organizational resilience (POR) and faculty organizational resilience (FOR). POR refers to the capability of the principal's organization to respond and adapt to challenging occurrences. It involves the specific characteristics and strategies that organizations employ to withstand and recover from disruptions (Hoy and Miskel, 2008; Buranapin et al., 2023). FOR focuses on the role of faculty members in supporting each other and leading the students' academic progress and overall well-being. FOR recognizes the impact of faculty actions and support systems on students' ability to succeed in their academic pursuits (Hoy and Miskel, 2008; Deva et al., 2023).

2.2 The relationship between middle-leaders' TL and CTE

The role of middle-leaders in educational institutions has emerged as a critical focal point in the landscape of school management and leadership. According to Harris et al. (2019) and Author2 (2020, 2022), these middle-leaders are not merely teachers but also designated authorities endowed with specific responsibilities. These responsibilities extend beyond classroom instruction to include leadership competencies, particularly in the realms of curriculum knowledge and pedagogical skills. Importantly, middle-leaders act as orchestrators of a team of peer teachers, aligning them toward collective objectives (De Nobile, 2018). These relational dynamic underscores the collaborative nature of middle leadership, positioning these leaders not as hierarchical superiors but as partners in the mission of educational excellence.

A central feature of the role of middle-leaders is their responsibility for pedagogical management (Leithwood, 2016). This entails a twofold mandate: first, to monitor the teaching staff, and second, to ensure both the professional growth of different teachers and the appropriate evolution regarding the curriculum. The monitoring function includes both oversight and quality assurance, requiring middle-leaders to actively engage with teachers' performance metrics and feedback mechanisms (Harris et al., 2019). This dimension is critical for sustaining and elevating the overall educational quality within the institution. Furthermore, the mandate extends to overseeing professional development and curriculum advancement. The middle-leaders bear the responsibility for fostering a culture of continuous learning among the teaching staff while also ensuring that the curriculum is aligned with both institutional goals and educational standards. This interlocking set of responsibilities serves to not only maintain but also elevate the teaching and learning environment within the school system (Edwards-Groves et al., 2016).

Numerous research findings suggest that TL shows a range of potential advantages to the general school organization and its workers (Kovačević and Hallinger, 2019). Transformational leaders offer teachers a shared vision and shared goals, values, and standards that encourage collaborative activity and a perception of mission, enhancing their execution (Berkovich and Hassan, 2023). TL aims to encourage teachers to achieve surpassing anticipated outcomes (Lee and Kuo, 2019). The four I's described below are indicative of the application of TL: (1) *Idealized influence*: a leader exhibits behaviors that followers aspire to emulate. (2) *Inspirational motivation*: a leader presents a visionary and inspirational perspective. (3) *Individualized consideration*: a leader ensures the personal welfare and motivational needs of teachers are met (4) *Intellectual stimulation*: a leader spurs teacher innovation by questioning norms, suggesting new ideas, and presenting unique challenges (Boies et al., 2015).

The CTE is related and rooted in Bandura's (1993, 1997) concept of self-efficacy. The broader concept of perceived collective efficacy is described by Bandura (1997) as "a group's shared belief in its conjoint capabilities to organize and execute courses of action required to produce given levels of attainments" (p. 477). While CTE shares similarities with this general conceptualization of collective efficacy, Bandura (1993) specifically refers to the beliefs that teachers within a school hold the collective capability of the faculty to positively influence student outcomes (Tschannen-Moran and Barr, 2004). This concept is entrenched in Bandura's (1989) social cognitive theory, suggesting that human actions are shaped by the interplay among personal factors, including cognition, the environment, and behavior. This collective belief system does not merely act as a reflective measure of faculty competence but also serves as a dynamic catalyst that influences a school's adaptability and resilience to both internal and external challenges.

The TL has been found to have a positive relationship with CTE (Cansoy, 2020; Liu et al., 2020; Voelkel, 2022). Studies have shown that when school leaders employ collective leadership practices such as trust, shared power, effective communication, and accountability, they can improve teachers' motivation and working conditions, leading to increased efficacy (Liu et al., 2020; Voelkel, 2022). Additionally, TL is related to teacher performance and competency, which in turn contribute to CTE (Liu et al.,

2020). Middle-leaders' TL prioritizes personal development, collaboration, and team unity, playing a pivotal role in achieving educational aspirations (Loo and Leh, 2018). These leaders stimulate educators to offer constructive suggestions, undertake initiatives beyond formal roles, and exhibit proactive conduct (Schmitt et al., 2016). Transformational leaders, through idealized influence, serve as exemplary figures for peers, offering constructive criticism, and stimulating motivation to accomplish goals (Prestiadi et al., 2020; Moreno-Casado et al., 2022). This leadership style cultivates an atmosphere in which educators gain confidence to achieve their objectives (Ninković et al., 2022). By leveraging inspirational motivation, transformational leaders engender a feeling of unified goals and routes, reinforcing a shared vision and a belief in collective capabilities, thus enhancing CTE. Intellectual stimulation from leaders fosters a versatile and innovative environment, encouraging creative thinking and the exchange of ideas (Schmitt et al., 2016; Loo and Leh, 2018). This in turn gives educators a feeling of empowerment to explore novel strategies. Individualized consideration contributes to a sense of achievement and pride among educators (Voelkel, 2022). Celebrating both individual and group accomplishments under TL further elevates the CTE of teams. Therefore,

> *Hypothesis 1*: Middle-leaders' TL is positively associated with CTE.

2.3 The relationship between CTE and OR

The CTE is intrinsically linked to the collaborative endeavors and persistent efforts of teachers to overcome challenges and attain shared objectives (Getachew and Zhou, 2018). CTE fosters a milieu in which beliefs and actions are mutually reinforcing. The research underscores a positive correlation between principals' transformational leadership (TL) and the enhancement of CTE (Karacabey et al., 2022). Accordingly, CTE acts as a pivotal component in fostering OR by enabling educational institutions to adapt and respond to challenges effectively. CTE affects the attainment of both personal and collective objectives and the well-being of teachers (Herrera et al., 2022). Teachers' observations of collective efficacy are vital to comprehending their well-being and subjective well-being is an intrinsic factor in OR (Nauly et al., 2022). Additionally, CTE is shaped by the self-efficacy attitudes and activities of the leader, which influences achievement and contributes to the building of resilience in schools (Banks, 2019).

The CTE might have a significant impact on OR in schools. Research has indicated that mechanisms through which CTE influences OR include trust, team communication, and organizational justice (Anderson et al., 2023). Thus, interpersonal trust and team-based communication are crucial for achieving individual and common goals, which in turn influence work productivity and teacher well-being. These findings suggest that fostering CTE among teachers can contribute to school resilience by promoting positive relationships, effective communication, and a supportive organizational environment. Hence,

> *Hypothesis 2*: CTE is positively associated with OR.

2.4 Mediation model: the mediating role of CTE in the relationship of TL and OR

The present study suggests that CTE functions as a mediator in the connection between TL and OR. As leaders stimulate intellectual growth and create an environment of mutual respect and trust, teachers' belief in their collective power to bring about change is reinforced (Harris et al., 2019). Consequently, this heightened sense of CTE can enhance the adaptive capacity of the organization, thereby bolstering its resilience. We propose that middle-leaders' TL promotes OR indirectly by facilitating CTE, which in turn enhances OR. Accordingly, we posit that CTE serves as a mediator whereby middle-leaders' TL has a positive influence on OR. Therefore,

> *Hypothesis 3*: CTE mediates the relationship of middle-leaders' TL to OR.

3 Methods

3.1 Study setting

The Israeli national school system is a complex and multifaceted entity, serving over two million students across more than 5,000 K–12 schools. The system is characterized by a significant divide between two major sectors: approximately 73% of the student population is in the Jewish sector, while the remaining 27% is in the Arab sector. This division is reflective of the broader social and economic landscape of Israel, which, as indicated by the Gini coefficient, experiences one of the widest gaps between the rich and poor among Organization for Economic Co-operation and Development (OECD) countries. This economic disparity is echoed in the educational achievements of students, with marked achievement gaps between Israel's central region and its more peripheral areas, predominantly due to socioeconomic factors. Despite efforts by educational policymakers to improve the outcomes of disadvantaged student populations, achievement levels in these groups remain relatively low, and the gap continues to widen, as shown by various international comparative studies (Dadon-Golan et al., 2019).

Israel's educational system operates under a highly centralized framework, with the Ministry of Education maintaining control over crucial aspects such as curriculum development, standards, testing, and the hiring and firing of teachers. While schools are mandated to follow a basic national curriculum, they are afforded the liberty to specialize in certain areas like the arts or environmental studies, in line with the Ministry's guidelines. In recent years, there has been a movement toward decentralization, exemplified by initiatives like school-based management and the promotion of school autonomy.

3.2 Participants and procedure

Data were gathered from 609 participants from 103 secondary schools randomly chosen in Israel. Information was obtained from two distinct sources, including self-report and external-report data, aiming to mitigate challenges related to single-source bias (Avolio et al., 1991). Of these, 103 were middle-leaders (i.e., grade-level coordinators, subject coordinators, and school counselors), each representing a distinct school,

and the other 506 were teachers. These teachers were working under the leadership of the respective middle-leaders from 103 secondary schools randomly chosen in Israel. In every school, there was one middle-leader assigned, with his/her staff consisting of an average of about 6 teachers, employed collaboratively under the leadership of the middle-leader ($M = 6.16$; $SD = 2.95$). On average, 85% of teachers within each school participated in the study, with a range of 65 to 95% of teacher response rates across the 103 schools.

The measurement of school size was determined by the average number of enrolled students, with a mean of 674.21 students ($SD = 471.18$) per school. Of the teachers ($N = 506$), 69.4% were female participants, with an average age of 42.06 years ($SD = 10.49$) and a mean seniority in the profession of 13.69 years ($SD = 10.39$). Regarding their education, 41.88% held a bachelor's degree, 56.98% held a master's degree, and 1.1% held a Ph.D. degree (as opposed to other types of doctoral degrees).

The data was collected between October 2020 and February 2021, during the COVID-19 pandemic. Data Research Topic for the research was completed in several steps following the Ministry of Education's approval. Schools were chosen at random, and principals were briefed on the study's objectives. Once consent was given, middle-leaders and teachers were invited to participate voluntarily through survey questionnaires. In our research, the sample was composed of teachers and their middle leaders, who serve as their team leaders. We initially approached 127 principals explained in general terms the goal of the research and asked for their approval of having their school participate. We then approached the middle-leaders to participate in the study, and 103 agreed, resulting in a response rate of 81.1%. Subsequently, we invited 572 teachers who work under their middle-leaders to participate, and 506 agreed, yielding a response rate of 83.4%. To distinguish each middle-leader and their team from other schools, unique random numbers to his/her school were assigned. To ensure the anonymity of the respondents, each middle-leader and their respective team were allocated a unique code, distinguishing them from other teams in the sample.

Teachers responded to questionnaires concerning their middle-leaders' Transformational Leadership (TL), their school's Organizational Resilience (OR), and a CTE questionnaire. The Socio-Economic Status (SES) of each school was ascertained from official records supplied by the Ministry of Education, and both middle-leaders and teachers supplied demographic information.

In the context of confirmatory factor analysis (CFA) and structural equation modeling (SEM), evaluating the fit of a research model is critical for ensuring the model accurately reflects the data. Following recommendations from Jöreskog and Sörbom (1993), Medsker et al. (1994), and Kline (2023), several goodness-of-fit indices were utilized to assess the fit of the research model. These fit indexes included the chi-square statistic divided by the degrees of freedom (χ^2/df), a Comparative Fit Index (CFI), the Tucker–Lewis Index (TLI), an Incremental Fit Index (IFI), and the Root Mean Square Error of Approximation (RMSEA). Consistent with the literature (Jöreskog and Sörbom, 1993; Kline, 2023), the following criteria of goodness-of-fit indexes were employed to assess the model fit: the χ^2/df ratio was recommended to be less than 3; the values of CFI, IFI, and TLI were recommended to be greater than 0.90; RMSEA was recommended to be up to 0.05, and acceptable up to 0.08 (RMSEA: values 0.05 or less indicate a good fit, values 0.06 to 0.08 a reasonable fit, values close to 0.10 a poor fit; see Steiger, 1990).

3.3 Measures

3.3.1 Middle-leaders' transformational leadership (TL)

Transformational leadership style was measured by the MLQ (Multiple Leadership Questionnaire), Form 5X-Short (MLQ 5X) (Bass and Avolio, 1994). Included in the questionnaire were 20 items representing 4 sub-dimensions, including idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration. A CFA was used to evaluate the multidimensionality of TL. CFA showed that the four-dimensional construct of TL offers good fit indices, χ^2/df = 2.70; CFI = 0.96, TLI = 0.95, IFI = 0.96, RMSEA = 0.058. Thus, CFA consuming maximum likelihood estimation supported a four-factor structure.

Standardized parameter evaluations from items to factors ranged from 0.57 to 0.87. Specifically, the CFA analyses offered evidence that the measures of the four activities point toward a model comprising four interconnected yet separate factors, each symbolizing a different leadership activity: *Idealized influence* (11 items) (e.g., "Leads to a sense of collective mission") ($\alpha = 0.92$); *inspirational motivation* (2 items) (e.g., "Talking about the future with optimism") ($\alpha = 0.83$); *intellectual stimulation* (4 items) (e.g., "Introducing new projects and new challenges") ($\alpha = 0.78$); and *individualized consideration* (3 items) (e.g., "Listens to my problems and concerns") ($\alpha = 0.82$). Teachers rated their middle-leaders' TL on a 5-point Likert scale ranging from *Never* (1) to *Always* (5).

3.3.2 Collective teacher efficacy (CTE)

Teachers fulfilled Tschannen-Moran and Barr's (2004) 12-item Collective Teachers' Beliefs Scale (Hebrew adaptation: Schechter and Tschannen-Moran, 2006) mirroring individual participants' views on their teams' ability to operate effectively. CFA showed that the two-dimensional construct of CTE offers good fit indices, χ^2/df = 2.86; CFI = 0.97, TLI = 0.96, IFI = 0.97, RMSEA = 0.061. Based on the CFA, the two sub-dimensions were CTE for *instructional strategies* (6 items) (e.g., "How much can teachers in your school do to produce meaningful student learning") ($\alpha = 0.89$) and CTE for *student discipline* (6 items) (e.g., "To what extent can teachers in your school make expectations clear about appropriate student behavior") ($\alpha = 0.88$). Teachers rated their CTE on a 5-point Likert scale ranging from *Never* (1) to *Always* (5).

3.3.3 Organizational resilience (OR)

A rating featured in the questionnaire of Hoy et al. (2006) which is based on the questionnaire developed by Weick and Sutcliffe (2001) was utilized. The scale rests on five properties: preoccupation with failure, reluctance to simplify, sensitivity to the unexpected, commitment to resilience, and deference to expertise. It includes 20 items reflecting quick adaptations to abnormal conditions and there are items for each parameter: one in the teacher's context and one in the principal's context. This questionnaire has been validated and used as a scale for OR in a recent study performed in the Israeli and educational context (Shani, 2020). The questionnaire's focus on organizational mindfulness is directly aligned with the broader concept of organizational resilience as described by prominent scholars in the field (Barasa et al., 2018; Duchek, 2020; Netolicky, 2020; Hillmann and Guenther, 2021). CFA indicated that the two-dimensional construct of OR provides good fit indices, χ^2/

df = 2.92, CFI = 0.94, TLI = 0.92, IFI = 0.94, RMSEA = 0.062. Based on the CFA, the two sub-dimensions were *Principal OR* (POR) (10 items, e.g., "When a crisis occurs the principal deals with it so we can get back to teaching," $\alpha = 0.91$), and *Faculty OR* (FOR) (10 items, e.g., "When things do not go well, teachers bounce back quickly," $\alpha = 0.82$). Teachers rated faculty and their principals on a 5-point Likert scale ranging from *Never* (1) to *Always* (5).

3.3.4 Control variables

The school's student socio-economic status (SES) and teacher education were used as controlled variables since these variables show a correlation with teachers' behaviors (Xie and Ma, 2019). The school's student SES represents the overall socioeconomic, family, and demographic risk factors that define the student body at each school and are reflected in the schools' nurturing index (NI). A high school's student SES score indicates schools having students from low SES families. The school's student SES score goes from 1 to 10. The schools' average SES score in the current sample was 4.48 ($SD = 2.58$).

3.4 Level of analysis

The school is designated as the unit of analysis in the research hypotheses. Therefore, the middle-leader TL, CTE, and OR, amounted to an aggregation of individual teachers' rating responses in which the group and the middle-leader are the referents and not the teacher as an individual. In this context, the aggregation of school-level variables assumes that all teachers in a given school are reflecting the same construct in their scores. As a result, teachers at similar schools can theoretically substitute for one another and directly rate the suggested factors (Morin et al., 2014). A significant level of consensus among teachers at a single school demonstrates the statistical dependability of the suggested constructs. For the statistical validation of aggregating measures from individual teacher ratings to the school level, we calculated mean rWG values – Within-Group Interrater Reliability (James et al., 1993; Dunlap et al., 2003), which indicate the degree of agreement among school teachers; utilizing the Intraclass Correlation Coefficients, namely ICC (1) and ICC (2), a rWG value at or exceeding 0.70 is recommended to represent a 'good' degree of agreement among team members (James et al., 1993). Within-group versus between-group variability is depicted by ICC (1), and the reliability of the group means is estimated by ICC (2) (Bliese, 2016). The reliability of school averages is evaluated using the ICC (2), a measure of both interrater reliability and interrater agreement (LeBreton and Senter, 2008). As shown by Bliese (2000), ICC (1) usually ranges from 0 to 0.50 with a median of 0.12. Overall, the findings justify using average scores of TL, CTE, and OR as organizational measures, as indicated in Table 1.

3.5 Data analysis

First, an analysis was conducted to determine if the outcomes of the subsequent measures—TL, CTE, and OR—exhibited a normal distribution. According to Hair et al. (2022), a skewness value falling between −1 and +1 is considered excellent and indicates substantial normality in large-sample studies. Additionally, to demonstrate a normal univariate distribution, values for asymmetry and kurtosis between −2 and +2 are also regarded as appropriate (George and Mallery, 2010). Second, the proposed model was tested using structural equation modeling. We used the parceling process (SEM, using the AMOS 23.0 software) to examine the structural model and to evaluate the proposed correlations among the constructs (Jöreskog and Sörbom, 1996), as suggested in Figure 1. By lowering the number of parameters and possible measurement errors, this method seeks to increase model fit, strengthen psychometric qualities, and simplify the measurement model (Lee and Whittaker, 2021).

In the current research, the full mediation model designates the relation of TL (independent variable) to CTE (mediating variable), and that of CTE to OR (dependent variable). To confirm the full mediation model (M1), M1 was subjected to comparative analysis to a partial mediation model (M2), which mirrors the model of M1 with the inclusion of additional routes stemming from the input variable of TL to the outcome variable of OR. A partial mediation model, with a significant χ^2 value relative to the full mediation model, indicates that CTE serves as a partial mediator in the connection between TL and OR. To measure model fit, a range of goodness-of-fit indices (comprising absolute and relative indices) was applied (Jöreskog and Sörbom, 1996). χ^2 values were indicated, which present a statistical rationale for contrasting the fit of nested models. Finally, we employed the bootstrapping procedure, grounded on a 5,000 bootstrap sample size, to confirm the presence of indirect effects (Preacher and Hayes, 2008).

The SEM relies on several key statistical assumptions to ensure the accuracy of the inferences drawn from the model. These assumptions include the presence of multivariate normality in the data, the absence of systematic missing data, a sufficiently large sample size, and correct model specification (Kline, 2023). To ensure that our data and analyses are robust to any violations of these assumptions, we conducted tests for multivariate normality (Weston and Gore, 2006), employed techniques to address missing data (Enders, 2022), verified the adequacy of our sample size (Wolf et al., 2013), and carefully assessed the model specification (Boomsma and Hoogland, 2001).

4 Results

The study's descriptive statistics, rWG, ICCs, and variable inter-correlations are illustrated in Table 1.

4.1 Preliminary analysis

The items do not exhibit a substantial bias to the normal distribution, according to the values of Skewness and Kurtosis, which range from 1.02 to −0.23 and 1.64 to −0.33, respectively. The study's visual examination of the distributions supported the normality assumption (George and Mallery, 2010; Hair et al., 2022).

4.2 Hypotheses test: structural model testing

The SEM depicted in Figure 2 provides a summary of the anticipated mediation model. The overall model fit was reasonable (χ^2/df = 1.67; CFI = 0.96, TLI = 0.94, IFI = 0.96, RMSEA = 0.081). However, inspecting the modification indices revealed that the covariances were

TABLE 1 Means, standard deviations, rWG, ICC(1), and ICC(2) and correlation matrix of study's variables $N = 103$.

	M	(*SD*)	rWG	ICC(1)	ICC(2)	1	2	3	4	5	6	7	8	9	10	11	12	13
(1). Transformational Leadership	1.82	0.44				1	0.96**	0.92**	0.90**	0.92**	0.26**	0.30**	0.38**	−0.27**	0.28**	0.35**	0.10	−0.21*
(2). Idealized influence	1.84	0.43	0.91	0.20	0.54		1	0.85**	0.82**	0.87**	0.28**	0.33**	0.41**	−0.24*	0.32**	0.38**	0.05	−0.18
(3). Inspirational motivation	1.82	0.55	0.78	0.24	0.61			1	0.78**	0.75**	0.23*	0.19	0.32**	−0.25*	0.24*	0.28**	0.16	−0.25**
(4). Individualized consideration	1.51	0.41	0.84	0.15	0.47				1	0.75**	0.16	0.26**	0.24*	−0.22*	0.22*	0.34**	0.09	−0.17
(5). Intellectual stimulation	2.11	0.51	0.85	0.20	0.56					1	0.28**	0.34**	0.42**	−0.27**	0.27**	0.30**	0.06	−0.16
(6). Collective Teacher Efficacy (CTE)	1.93	0.37									1	0.54**	0.58**	−0.07	0.28**	0.27**	0.01	−0.17
(7). CTE Instructional strategies	1.84	0.41	0.91	0.16	0.48							1	0.57**	−0.14	0.37**	0.46**	−0.13	0.04
(8). CTE Student discipline	2.03	0.40	0.91	0.19	0.53								1	−0.17	0.55**	0.40**	−0.04	−0.25*
(9). Organizational Resilience (OR)	2.20	0.37												1	0.01	−0.25**	−0.15	−0.01
(10). Principal OR (POR)	2.06	0.44	0.86	0.17	0.50										1	0.52**	0.04	−0.10
(11). Faculty OR (FOR)	2.33	0.36	0.93	0.19	0.53											1	0.09	−0.02
(12). Teacher education	0.59	0.27															1	−0.06
(13). Socio-economic status (SES)	4.48	2.62																1

ICC, intra-class correlation; rWG, interrater agreement. *$p < 0.05$, **$p < 0.01$.

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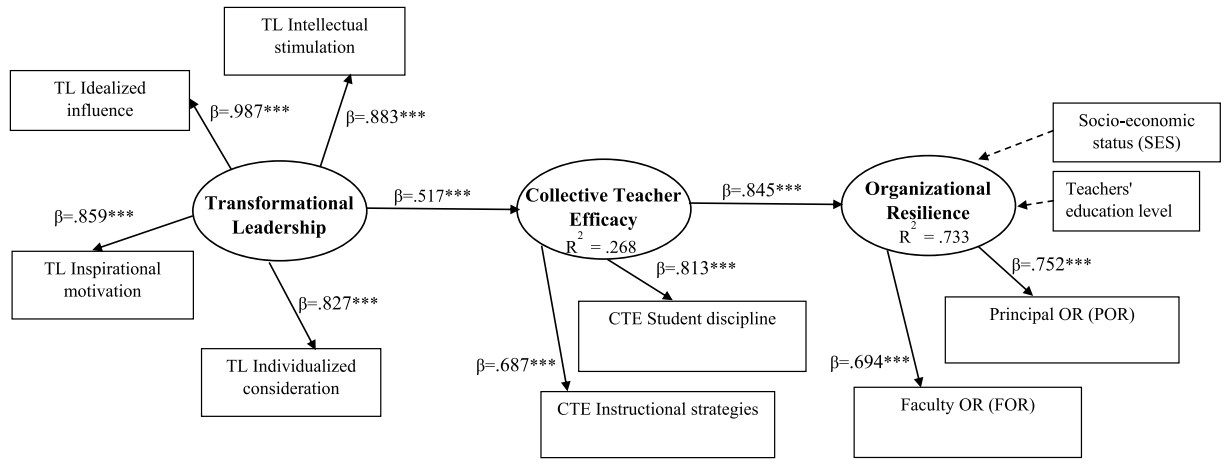

FIGURE 2
SEM results for the proposed model—full mediation model 1. Standardized parameter estimates for the theoretical model; + non-significant relationship (the non-continuous line in the model). (χ^2/df = 1.59; CFI = 0.97, TLI = 0.95, IFI = 0.97, RMSEA = 0.077). CFI, comparative fit index; IFI, incremental fit index; RMSEA, root mean square error of approximation. ***$p < 0.001$.

TABLE 2 Results of SEM and bootstrapping for predicting the relationship of TL to CTE (Mediator) on OR (Outcome variable).

				Bootstrapping	
Mediation pathway				Confidence interval (95%)	
Indirect effects on the dependent variable: OR	X-M Path a	M-Y Path b	Mediation effect	Lower	Upper
TL ➔ CTE ➔ OR	0.517***	0.845***	0.437***	0.197	0.674

***$p < 0.001$. SEM, structural equation modeling; TL, transformational leadership; CTE, collective teacher efficacy; OR, organizational resilience.

high between some subdimensions. This provided additional statistical support for the theoretical case that some subdimensions are related and thus adding covariances between subdimensions improved the model data fit. Results about model M1 (full mediation model) indicated an acceptable level of goodness-of-fit indices (χ^2/df = 1.59; CFI = 0.97, TLI = 0.95, IFI = 0.97, RMSEA = 0.077). The full mediation model (M1) underwent a comparative analysis against a competitive partial model to ascertain significant gains in explanatory power; this comparison included a partial mediation model (M2) for OR outcomes. Specifically, M2 was employed to assess a direct effect possibility between TL and OR. This alternate model—M2, showed an acceptable level of goodness-of-fit indices (χ^2/df = 1.64; CFI = 0.96, TLI = 0.94, IFI = 0.96, RMSEA = 0.079); however, no significant difference in the fit was observed ($\Delta\chi^2(1) = 0.406$, $p > 0.010$). These findings indicated a better fit of M1 to the data compared to M2. The present study used the school's student body SES, and teacher education, as controlling factors during the hypothesis testing. The findings (see Figure 2) presented indicated that the overall model explained 73.3% of the variance in the OR.

H1 concerns the relationship between TL and CTE. The findings indicate that TL was positively correlated to CTE ($\beta = 0.517$, $p < 0.001$). The results fully confirmed H1. Similarly, H2 concerns the relationship between CTE and OR. The findings indicate that CTE was positively correlated to OR ($\beta = 0.845$, $p < 0.001$). The results fully confirmed H2.

H3 addresses the mediating role of CTE in the connection between middle-leaders' TL and OR. As previously stated, bootstrap analyses were conducted to rigorously ascertain the statistical significance of the mediated effects identified in the model (Shrout and Bolger, 2002). The results of the bootstrapping are presented in Table 2 and provide additional support for a full mediation model for the OR.

5 Discussion

The present study focused on OR and sought to examine whether CTE serves as the mediator in the relationship between TL and OR. Overall, our results add to the existing recognition of the contribution middle-leaders' leadership can make in ensuring the continuity of educational processes, protecting student well-being, and facilitating the continued advancement of student academic achievement (McLeod and Dulsky, 2021). Our research findings reveal a significant relationship between middle-leaders' TL and OR, a relationship that is mediated by CTE. This nuanced interplay underpins existing literature (Loo and Leh, 2018; Cansoy, 2020) on the role of TL in strengthening CTE, which in turn increases OR (Kunnari et al., 2018; Sezen-Gültekin et al., 2020). The positive correlation between CTE and OR supports Bandura's (1997) theory that collective efficacy beliefs have a strong influence on an organization's resilience capacity, defined as its ability to adapt and thrive during stressors.

Specifically, the analysis demonstrated a positive relationship between TL and CTE. Transformational leaders are known to instill a sense of purpose, inspire their subordinates, and foster an environment in which individuals feel valued (Burns, 1978). In the context of educational institutions, when middle-leaders employ TL styles, they

are more likely to create an atmosphere in which teachers feel empowered, competent, and collectively capable of meeting challenges. This positive environment fosters greater CTE among teachers (Cansoy, 2020). This relationship provides invaluable insights into the intricacies of educational dynamics. Transformational leaders bolster the collective confidence, competence, and commitment of educators through several key approaches: (1) they convey a clear, compelling vision, aligning it with educators' motivations, and fostering a unified belief in their ability to achieve significant results (Bush, 2014), (2) they value individual strengths and needs, which enhances overall team efficacy (Shrestha, 2020), (3) they encourage innovation, resilience, and collaboration, ensuring that educators not only feel supported but are also driven to overcome challenges and work cohesively (Supermane, 2020), and lastly, (4) through constructive feedback, they empower educators to continuously improve, solidifying their collective faith in their capabilities (Voelkel, 2022).

Similarly, the results pointed to a positive correlation between CTE and OR. There are several potential reasons for these important findings. First, research has indicated that collective belief in ability fosters a unified approach to obstacles, enabling institutions to effectively overcome and rebound from challenges (Schechter et al, 2022). Second, schools with high levels of CTE show adaptability to shifting educational landscapes, from policy changes to external crises (Voelkel, 2022). Third, research has indicated that such a sense of CTE also reinforces a positive institutional culture, bolstering resilience during challenging periods (Park et al., 2020). Thus, potentially, institutions exhibit a proactive stance, strategizing in anticipation of challenges. Fourth, underpinned by the collective belief in shared strengths, perhaps an emphasis on continuous learning occurred, with teachers collaboratively focusing on growth and adaptability.

Finally, the results of the overall model are significant as they highlight CTE, a key mechanism that promotes OR. The reasons for these findings include: (1) *Clarity in Process:* CTE elucidates how TL enhances OR, indicating that leaders' TL might bolster CTE (Prelli, 2018), leading to improved OR. (2) *The Mechanism of Intervention:* Transformational leaders' ability to inspire and motivate staff can amplify CTE (Cansoy, 2020), subsequently boosting institutional resilience and adaptability. (3) *Measuring Impact:* Examining CTE as a mediator allows an assessment of TL's impact on OR, attributed to high levels of CTE, enabling institutions to gauge the incremental value of TL initiatives (Kocak and Özdemir, 2020). (4) *Precision in Interventions:* With CTE as a recognized mediator, tailored interventions can be developed, focusing on equipping leaders with skills that amplify efficacy (Prelli, 2018). (5) *Theoretical Enrichment:* Incorporating CTE into the model augments the theoretical understanding of school dynamics, linking leadership approaches to organizational results (Torres, 2022). While TL by middle-leaders can have a direct effect on a school's OR, understanding the mediating role of CTE provides a deeper, more nuanced understanding of this relationship. The present results highlight the pathways through which leadership practices translate into tangible organizational outcomes, enabling stakeholders to optimize processes and achieve desired results.

5.1 Limitations and future studies

Future studies should address the limitations identified in this research. First, this study's design is not capable of providing direct evidence for causality between middle-leaders' TL, CTE, and OR. It might be that the causal relationship is in reverse. The possibility of two-way causality also cannot be eliminated. Therefore, longitudinal research designs in future studies would be instrumental in validating the causal inferences suggested here, especially in diverse educational settings across different cultures and socio-political landscapes. Second, the sample involved secondary school faculty and middle-leaders, limiting the capability to generalize the results to other sectors, in which there could be variations in the staff's demographic attributes. Finally, the analysis in this study was restricted to only a few chosen antecedents and outcomes. Thus, future studies can explore the differential impact of other leadership styles beyond TL, and how they may interact with CTE, thus influencing the overall resilience trajectory of educational institutions (Liou and Daly, 2019).

5.2 Conceptual and practical implications

This research encompasses both theoretical contributions and practical implications. Theoretically, this study broadens the literature on the relationship between TL and CTE in educational settings. By revealing the significance of CTE as a mediator between TL and OR, the study contributes to the burgeoning awareness of the complex connections between leadership paradigms, collective attitudes, and organizational outcomes, thereby offering a more comprehensive landscape of institutional operations. The results further accentuate the essence of examining the pathways through which leadership practices shape and are reciprocally shaped by the broader organizational milieu. The research contributes to the recognition of the connection between middle-leaders' leadership and teachers' job attitudes and supports the idea that middle-leaders can serve a vital role in forming sustained positive and healthy schoolwork surroundings (Ariffin et al., 2018; Meyer et al., 2022; Author3 and Colleague, 2024).

Practically, the insights garnered from this research have paramount significance for a diverse of stakeholders in the educational ecosystem. Both educators and policymakers can harness these findings, emphasizing the centrality of cultivating positive dynamics between leadership figures and the broader teaching faculty. This can materialize through meticulously crafted training initiatives that spotlight behaviors pivotal in fostering CTE, and by pinpointing leadership figures whose ethos synergizes with bolstering CTE. Overall, encouraging leadership behaviors that support positive collective attitudes can not only enhance the institution's immediate educational ability but also strengthen its long-term resilience and adaptability.

6 Conclusion

This study on managing complex school systems concludes that TL and CTE are significant predictors of OR in educational institutions. The findings suggest that enhancing TL and fostering a strong sense of CTE can lead to increased organizational resilience. However, the study also acknowledges several limitations and calls for future research to validate the causal inferences and explore the impact of other leadership styles on OR. Overall, the study has both conceptual and practical implications for educational institutions seeking to improve their resilience in the face of complex challenges.

Data availability statement

The datasets presented in this article are not readily available because the data is private. Requests to access the datasets should be directed to ayala.zadok2@gmail.com.

Ethics statement

The studies involving humans were approved by faculty of education- Bar-Ilan University. 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.

Author contributions

AZ: Conceptualization, Methodology, Writing – original draft, Formal analysis. PB: Conceptualization, Methodology, Writing – review & editing, Supervision, Project administration. CS: Conceptualization, Supervision, Writing – review & editing.

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Conflict of interest

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

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