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# Linking public leadership and public project success: the mediating role of team building

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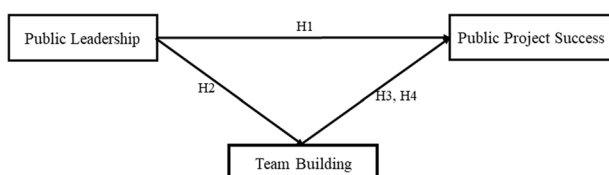
The existing research has linked the mainstream leadership styles to project success and team building. However, there is a lack of research evidence on how public sector-specific leadership styles influence project success and team building. This research uses social information processing theory to explore the influence of public leadership on project success and team building. The study also explores the fundamental processes by which public leadership engenders project success via the mediating mechanism of team building. Analysis of 436 responses from both public sector projects managers-subordinates dyad showed that public leadership positively relates to project success and team building. The analysis also showed that team building positively influences project success. Moreover, the findings revealed that team building partially mediates the influence of public leadership on project success.

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## Introduction

Project success is a key concept of the project-management discipline and an ultimate focus of various project stakeholders (Arnaiz et al. 2022; Bastida 2002; Osei-Kyei and Chan 2018; Volden 2018). Project success is referred to as project completion according to the approved schedule, budget, and performance standards (triple constraints), while also satisfying the expectations of project stakeholders (Atkinson 1999; Baratta 2006; Pollack et al. 2018). Unfortunately, most of the projects fail to meet the approved criteria of success. According to reports, the average rates of project failure and success are reported around 70 and 30% respectively (Cleary-Hardy 2021; PMBOK 2013). The national audit report of the United Kingdom has shown that two out of three public sector projects are failed endeavors, and the rate of public sector project failure is even worse in Pakistan (Fareed and Su 2021). To increase the rate of project success, researchers continue to identify critical success factors (CSFs) of projects, where leadership behavior (style) is recognized as one of the most important CSFs of success. Previous literature has identified several mainstream managerial leadership styles including transformational, ethical, servant, and inclusive leadership in positive relation to project success (Cleary-Hardy 2021; Muhammad et al. 2021; Nauman et al. 2021). Compared to the mainstream leadership styles, the new public management scholars emphasize that public sector organizations demand distinct and relevant leadership approaches for balancing “the entanglement of formal, top-down, administrative, emergent, and adaptive functions with different levels of complexities” (Murphy et al. 2017). Public organizations present a distinct environment where the inherent “publicness” factor provides a unique situation for leaders (Crosby and Bryson 2018; Vogel and Werkmeister 2021). Following the recommendations of Van Wart (2003) for conceptualizing public sector-specific leadership approaches, Tummers and Knies (2016) have conceptualized the four dimensions of the public leadership approach based on effective leadership characteristics possessed specifically by managers working in public agencies. Tummers and Knies (2016) and Vogel et al. (2020) suggest that effective leadership in the public sector entails several key aspects. These include promoting open communication and engagement with stakeholders of the public agency (referred to as accountability leadership-AL), emphasizing adherence to rules and procedures (rule-following leadership-RL), fostering positive relationships with politicians and defending their decisions (political loyalty leadership-LL), and motivating individuals to establish and maintain networks with all organizational stakeholders (network governance leadership-NL). Public leadership is widely acknowledged as an influential and effective leadership style specifically tailored for the public sector. Scholars in this field, such as Tummers and Knies (2016) and (Vogel et al. 2020), have emphasized the need for empirical research to explore the connections between public leadership and various variables at the employee and organizational levels within public sector agencies. However, the existing literature lacks empirical evidence between public leadership and project success (Fig. 1).

Social Information Processing (SIP) theory suggests that individuals form their attitudes and behaviors by processing



**Fig. 1** Theoretical framework.

information cues they receive from the external environment (Salancik and Pfeffer 1978). This theory supports that as a leader holds the highest status and power in organizations, therefore subordinate employees actively evaluate information about the leadership behavior to act the way which is expected by the leadership, with expectations that this will attract appreciation and averse the risk of criticism from the leadership (Khan et al. 2022). Using this theory Nauman et al. (2021) argued that the project managers’ transformational leadership behavior transforms the project team attitudes that lead towards successful project accomplishment. Public leadership is recognized as a specific and relevant form of transformational-leadership within the public sector (Tummers and Knies 2016). Using SIP theory, public leadership characteristics may influence project team attitudes and behaviors in a direction that leads to project success. For example, the accountability aspect of public leadership may improve actions, communications, and expertise sharing within the team which led them to remove barriers in the way of efficient project completion (Pollack and Matous 2019), and actions communications sharing with outside stakeholders may attract their involvement and subsequently satisfaction from the project (Osei-Kyei and Chan 2018). The rule-following aspect of public leadership may activate the team’s attitudes toward adhering to action plans which leads them toward the effective accomplishment of project goals (Kerzner 2017). The political loyalty aspect of public leadership may inspire team loyalty toward the achievement of project outcomes (Khan et al. 2019). The network governance aspect of public leadership empowers employees to work in collaboration with peers and with outside stakeholders of the project, which enables them to receive the required expertise and support for the efficient accomplishment of the project (Pollack and Matous 2019). Using the propositions of SIP theory, we assume that the perceptions of the attributes of public leadership including (e.g. accountability, rule-following, political loyalty, and network governance) may transform public servants toward the accomplishment of project success.

Team building plays a pivotal role in team-based research and carries significant implications across many disciplines, including the field of project management (Kastrup 2019). However, there lack of sufficient research regarding teams in public management (Chin 2015), the success of a public manager is dependent on his/her ability to form an efficient team (Banovetz 1990). Team leadership is considered a significant factor in team building (Aga et al. 2016). Effective team leadership creates a conducive work environment where members are working together efficiently for the achievement of common goals (Grynenchenko et al. 2018). The existing literature lack of empirical investigation into the association between public leadership and team building. Earlier research has identified that the perceptions of leadership have a dual impact on project success, both directly and by influencing team-building processes (Fareed and Su 2021). Team-building is defined as promoting the efficiency and effectiveness processes of setting and achieving team goals, clarifying individual and shared roles, responsibilities, and organizational norms, developing interpersonal relationships, and identifying problems and ways for resolving problems (Kastrup 2019; Rovio et al. 2010). Social psychological theories including SIP theory are applied for explaining the influence of supervisory leadership and project team building (Nauman et al. 2021). Scott et al. (2018) propose a comprehensive leadership style, while Nauman et al. (2021) highlight the positive impact of transformational-leadership on team outcomes, including team building. As mentioned above “public leadership is a public sector-specific transformational leadership style” (Tummers and Knies 2016). Using SIP theory, the accountability aspect of public leadership may influence the

team building processes (goals setting, roles clarification, interpersonal relationships, and problems solving) because of greater emphasis on open and honest sharing of actions and communications within the team and with project stakeholders. The rule-following aspect of public leadership may influence employees' individual and shared roles and duties and may influence them to resolve interpersonal conflicts and problems because of streamlining their behaviors. The political loyalty aspect of public leadership may influence the interpersonal relationship and problems solving dimensions of team building because of encouraging them to stay loyal and committed to a common cause. The network governance aspect of public leadership may influence the team building processes (e.g. goals setting, interpersonal relationships, and problem resolving) because of empowering and motivating team members to work in networks and collaborations. This discussion leads us to assume that all the attributes of public leadership combined influence public servants' team building, which ultimately influences project success (Nauman et al. 2021).

Using SIP theory (Salancik and Pfeffer 1978), this study examines for the first time the influence of public leadership on project success and team building, and the impact of team building on project success. The study also examines the impact of public leadership on project success via the mediating mechanism of team building. This study extends the existing literature on public leadership to project success and team building in the public sector project management context.

### Literature review and hypotheses development

*Linking public leadership and project success.* National governments from around the world plan and execute programs for various socio-economic purposes. The government of Pakistan budget and execute thousands of public sector projects each Year as well (Khan et al. 2021). The inception of these projects is predominantly driven by the political leadership and formulated by central and local planning agencies. Eventually, they are entrusted to public managers and their teams for implementation, to serve the public's interests. Government, political leadership, planning agencies, execution agencies, public managers, project teams, and the general public are all the stakeholders of these projects, and these all have stakes in the successful implementation of these projects (Fareed and Su 2021). Project success is referred to as a project achievement within schedule, estimated budget, and performance standards (Atkinson, 1999), as well as with minimal or agreed-upon scope changes. Additionally, the acceptance of the project by end users or clients is an important criterion for determining its success (Baratta 2006; Pollack et al. 2018). Several researchers agree that a public sector project is successful when it is completed efficiently (achieving the triple constraints), achieves a certain impact, produces organizational benefits, offers opportunities for future learning and growth, and satisfies stakeholders (Khan et al. 2013; Santos et al. 2020; Volden 2018). Project failure and success depend on various factors (Frefer et al. 2018), however, a project manager's leadership behavior is recognized as a prominent aspect that either causes failure or success. Fareed and Su (2021) found that poor project leadership style accounts for 80% of project failures. The existing empirical literature has reported that various mainstream leadership styles variously influence project success, for example, transformational-leadership influences project success by empowering, motivating, and building project teams (Ali et al. 2020a, 2020b; Fareed and Su 2021). Ethical leadership through creating an environment where employees follow high ethical norms and values (Bhatti et al. 2021), servant leadership through serving, caring, and empowering subordinates (Cleary-Hardy,

2021) and inclusive leadership through creating an environment of inclusivity and opportunities where all the project team members participate and receive support from the leader Khan (Khan et al. 2021). The relationship between mainstream leadership behaviors and project success received support through social psychological theories including social learning theory (Bhatti et al. 2021) and SIP theory (Nauman et al. 2021).

Compared to the mainstream leadership approaches, public management scholars emphasize that public sector employees and organizations require different, specific, and relevant leadership behaviors for efficient and effective performance and success, some scholars argue that effective public sector leaders are less materialistic (Boyne 2002) more open and conscious (Judge et al. 2002) more participatory rather than directive (Hansen and Villadsen, 2010). Crosby and Bryson (2010) asserted that public leaders play a crucial role in fostering collaboration among diverse groups and organizations, spanning sector boundaries, to address complex public problems and work towards achieving a common good. Getha-Taylor et al. (2011) have characterized public sector leadership as a form of leadership that is oriented towards the common good and the creation of public value. Following these earlier research studies and using the relationship-based view of leadership, Tummers and Knies (2016) have conceptualized the four dimensions construct of public leadership based on effective leadership attributes of public managers. Where (1) AL promotes open and transparent communication between followers and organizational stakeholders. (2) RL emphasizes the importance of adhering to rules and procedures. (3) LL focuses on maintaining positive relationships with political leaders and defending their choices. (4) NL encourages subordinates to establish and nurture connections within and outside of the public agency. The first three dimensions of public leadership are the core attributes of public sector organizations while NL was included because of the increasing significance of working with public agencies (Agranoff 2007). The earlier empirical literature has noted that "public leadership is positively related to employees' organizational commitment, engagement, motivation, service performance, citizenship behavior, and change orientations" (Tummers and Knies 2016), teachers' professionalism, and public schools' effectiveness (Kocak and Bozkurt Bostanci 2020). Schwarz et al. (2020) have reported a positive impact of public leadership on motivation and performance, under the light social learning theory. The empirical literature regarding public leadership theory is limited and Tummers and Knies (2016) and Vogel et al. (2020) emphasize additional empirical studies to explore the effects of public leadership on various variables within the public context. Specifically, the existing literature has lack empirical research evidence regarding the influence of public leadership on project success in public agencies.

Using SIP theory, we assume that public leadership influences project success in several ways, for example, the accountability aspect of public leadership may improve sharing of actions and expertise among team members helping them in resolving workplace problems and the implementation of project action plans in professional ways. The expertise sharing could facilitate employees to correct procedures for implementing plans efficiently (Feeney and Sult 2011) as well as improve stakeholders' involvement and satisfaction (Davis 2017). Literature supports that perceived accountability is linked with the perceptions of improved performance in public agencies (Brunhart 2013). The rule-following aspect of public leadership may influence the team members to act according to the specified project actions and procedures for achieving project outcomes. Public sector projects are well-planned and following such plans and procedures may lead to the successful completion of projects (Bayiley and Teklu

2016). The employees' adherence to rules and regulations can play a crucial role in facilitating the adoption of process management reforms, leading to enhanced effectiveness (Trkman 2010). Rule abidance can align their actions more effectively with the project goals, ensuring that tasks are completed efficiently and following set standards (Borri and Henderson 2020). The loyalty aspect of public leadership may influence team members to stay loyal and committed to defending the choices of political heads, which can be defended only when the projects are accomplished. Employee loyalty is identified as an important factor in promoting voice behavior (K. I. Khan et al. 2021), satisfaction (Turkyilmaz et al. 2011), and organizational effectiveness in public agencies (Rahimpour et al. 2020). The network governance attribute of public leadership may motivate and empower subordinates to cultivate new connections both within and outside the organization, which may improve team members' professionalism (Kocak and Bozkurt Bostanci 2020). This leadership aspect may influence stakeholders' participation, which might help in allocating the resources required completing tasks (Osei-Kyei and Chan 2018). Using SIP theory, we assume that the characteristics of public leadership (AL, RL, LL, and NL) combine alter subordinate employees' attitudes toward achieving project outcomes. The following hypothesis is developed for analysis.

**H1:** Public leadership is positively associated with project success.

### Linking public leadership and team building

Team-building has importance in various disciplines including project management. Public sector projects are complex endeavors that required two or more individuals to work as a team to achieve common goals. Building a high-performance team is vital for organizational survival and success (Dyer Jr and Dyer 2019). Team building is referred to as team processes including goal setting, role clarification, interpersonal relationships development, and problems solving (Salas et al. 1999). Goal setting is referred to as team members working together to set clear goals and identifying ways to achieve common goals (Salas et al., 2004). Role clarification is team members acting on clarifying individual roles, shared responsibilities, and organizational norms (Klein et al. 2009). Interpersonal relationship development is efficient communication and cooperation of team members to identify and achieve outcomes (Senécal et al. 2008). Problem-solving is referred to as team members working together to find problems and their subsequent solutions (Misra and Srivastava 2018). The four dimensions construct of team building is commonly used for measuring team building (Kastrup 2019).

Earlier literature supports that leadership behavior has imminent significance in general team building (Wolemonwu 2021) and project management context as well (Ali et al. 2020a, 2020b; Misra and Srivastava 2018). According to SIP theory, the transformational leadership style alters employees' attitudes to form stronger project teams (Nauman et al. 2021). Using SIP theory, the characteristics of public leadership including emphasizing "accountability, rule-following, political loyalty, and network governance" (Tummers and Knies 2016) may influence team building in various ways. For example, the accountability dimension may alter employees' attitudes to sharing their actions and ways of working openly and honestly among themselves, which may improve their mutual accountability and information sharing in setting goals and identifying ways to achieve those goals. Employees' open communications may improve their interpersonal relationships and may help them in clarifying individuals and shared roles and responsibilities (Pollack and Matous 2019) and may enable them to resolve problems (Bane 2004) and

improve team functioning (Katzenbach and Smith 2005; Khan et al. 2023). The rule-following dimension of public leadership may alter employees' attitudes to adhere to individual and shared roles and responsibilities and organizational norms to achieve team outcomes (Yukl 2012). Employees' tendencies to follow rules and procedures may help in resolving their interpersonal problems and conflicts because of streamlining employees' behaviors (Fapohunda 2013). According to Vogel et al. (2020), the rule-following dimension of public leadership is more effective when followers' compliance and adherence to rules and procedures are required and particularly when the followers are problematic. The third dimension of political loyalty leadership may alter employees' attitudes in such a way that they stay loyal to one another, which may improve their relationships and reduce the risk of arising interpersonal issues and problems. Employee loyalty works for improving interpersonal trust and commitment toward a common cause (Hart and Thompson 2007) and improves team cohesion (Lewis 2011). Loyalty is an important component of problem-solving in the exit-voice-loyalty-neglect typology suggested for solving interpersonal problems (Rusbult and Zembrodt 1983). The network governance attribute of public leadership may influence team building in such a way that the team members activate to work together and with different stakeholders of the project, which may enhance their abilities and expertise to formulate appropriate action plans and ways of working to achieve team goals (Oh et al. 2019). Networking is a goal-directed behavior which is occurring within and outside of the organization and focuses to create, cultivate and utilize interpersonal relationships (Gibson et al. 2014). Networking improves team building in the form of improved team interactions (Pollack and Matous 2019), managers are required to improve social networks by improving employees' interpersonal relationships which facilitates creativity (Ozer and Zhang 2021), networking may encourage collective problem-solving in response to the challenges posed by the work complexity in modern organizations (Graesser et al. 2018). The existing empirical research has noted that the perceived four dimensions construct of public leadership attributes enhances subordinate public employees' professionalism in public agencies (Kocak and Bozkurt Bostanci 2020). Using SIP theory, we assume that the attributes of public leadership create an environment where employees activate to build a stronger team for executing projects. Based on this discussion, we draw the following hypothesis.

**H2:** Public leadership is positively associated with team building.

### Linking team building and project success

Team building has high importance for a group of individuals to work together in an efficient way to produce outcomes. The four dimensions construct of team-building (goals setting, roles clarification, interpersonal relationships, and problems solving) has various desirable attitudinal, behavioral, and organizational outcomes (Kastrup 2019) including teamwork (Fapohunda 2013), project team performance (Opfer 2004), and project success (Nauman et al. 2021). The dimensions of team-building influence project success in various ways, for example, goals setting is viewed as the process of team members working on the specification of the project goals, objectives, and corresponding performance indicators and defining action plans (Widmeyer and Ducharme 1997), which increases the likelihood that the goals are achieved efficiently (Aga et al. 2016). Goal setting is leading to goal clarity, which ultimately influences the perceptions of project success (Oh et al. 2019). The role clarification dimension of team-building minimizes conflict and promotes team functioning and decision making which leads to the efficient accomplishment of



tasks (Salas et al. 1999). Team members following individual roles and shared responsibilities and organizational norms streamline team members' behaviors toward accomplishing project outcomes (Aga et al. 2016). The third dimension of team building interpersonal relationships improves team members' communication exchange, expertise sharing, and mutual support and cooperation (LePine et al. 2008), which improve project team interpersonal trust and cohesiveness (Potnuru et al. 2018) and remove team conflict and improve interpersonal monitoring and ultimately leads to team efficiency and performance outcomes (Darling and Utecht 2010). Interpersonal trust and team potency play a significant role in building team resilience which is highly important during crisis conditions (Pavez et al. 2021). Similarly, encouraging employees to find and resolve problems through action planning, and empowers them to overcome barriers and achieve task completion (Wiltshire et al. 2018). Public sector projects are complex endeavors, where team members are required to execute different activities and tasks accurately to accomplish project outcomes (Fareed et al. 2021). The ability of team members to identify existing and potential issues and find ways to resolve those problems increase the likelihood that the project can be accomplished efficiently to generate certain pre-determined project outcomes (Nauman et al. 2021). We assume that the public leadership characteristics provide the required inspiration, where the employees participate in team building to influence projects' success. Based on this discussion, we draw the below hypothesis.

**H3:** Team building is positively associated with project success.

### The mediating effect of team building

Team-building plays a crucial role as a mediating mechanism between project managers' leadership style and project success (Kastrup 2019). Earlier studies have noted that transformational-leadership (Aga et al. 2016; Nauman et al. 2021) and humble leadership (Ali et al. 2020a, 2020b) influence project success via the mediating mechanism of project team building. Public leadership is viewed as a public sector-specific transformational leadership behavior, which influences employees' behavioral and organizational outcomes via influencing employees' attitudes and behaviors (Tummers and Knies, 2016). For example, Schwarz et al. (2020) demonstrate that public leadership influences employees' job performance by altering their public service motivations. Kocak and Bostanci (2020) argued that public leadership influences public schools' effectiveness by engendering teachers' professionalism. Using SIP theory, the public leadership attribute of accountability may prosper a culture where team members are more actively engaged in goal setting, role clarification, interpersonal relationship building, and problems solving, which facilitate more efficient achievement of project outcomes. The attribute of rule-following alters team members' tendencies to more actively adhere to the established individual and shared roles, responsibilities, and procedures which leads to team success (Bane 2004). The loyalty aspect of public leadership may convert the attitudes of subordinates to stay more loyal and committed to one another which is likely that the team members to resolve interpersonal conflicts and problems more actively and honestly to achieve the project aims more actively. Leaders' loyalist attitude prospers communication and cooperation among team members which is likely to lead to the achievement of project outcomes. The network governance attribute of public leadership influences subordinate employees to more actively interact with one another to set team goals, and roles, and to resolve interpersonal problems, which indirectly leads to project achievement. Using the propositions of SIP theory, we assume that public leadership may indirectly influence project success

through the mediating mechanism of team building. The following hypothesis is formulated for empirical testing.

**H4:** Team building mediates the association between public leadership and project success.

### Methods

**Sample and procedures.** Data for the study was collected through an online descriptive survey. For collecting data, we have approached first the "Planning Department" of Khyber Pakhtunkhwa Province of Pakistan. This department is responsible for the formulation and supervision of national development plans and projects at the provincial level. The secretary of the planning department has permitted us for conducting the survey and engaged his sub-ordinate to facilitate us with the provision of personal identities and email addresses of public project managers working in different public departments including mostly police, education, income tax, public works, and social welfare departments. The subordinate to the secretary has provided us with the 612 email addresses of the project managers. We have sent out the survey link (<https://forms.gle/NNZngAMvMzegJm29>) and a response request letter at the email addresses of the project managers and requested them to share the survey link and response letter to one of your sub-ordinate who has recently completed a public sector project with you. Details of the purpose of the study and the anonymity of responses were emphasized in the request-response letter. The online Google form survey was designed in such a way that we have put the first conditional option as: have you finished any public sector project recently (in the past two years)? Clicking "Yes" allowed the respondent to the next section. We have put two options in the next section option 1 was "project leadership (topmost head)", and option 2 was "subordinate to the project leadership (head)". Clicking the first option was leading the managers to respond to project success, team building, project-related general information, demographics, and his/her name. Clicking the "subordinate to project leadership (head)" option was leading subordinate civil servants to the measures of the public leadership questionnaire, the name of the project head, project-related general information, and demographics of respondents. Following this process, we have received 458 valid responses from project managers and 436 valid responses from subordinate civil servants. Using the names and project titles, the 436 responses of the sub-ordinate civil servants were matched with the responses of their project leaders. The findings of the scholarship are based on the total valid response rate of 71%. The potential demographic control factors of 436 project management that may influence project success are presented in the following (Table 1).

**Measures.** This research utilized existing measurement instruments to assess the constructs. Participants were asked to rate their agreement on a five-point Likert scale, ranging from "1" for strongly disagree to "5" for strongly agree. The measurement of public leadership was based on an eleven-item instrument suggested by Vogel et al. (2020) which adopted the initial scale of (Tummers and Knies 2016). The instrument used in the study demonstrated high internal consistency, with a Cronbach's alpha ( $\alpha$ ) reliability coefficient of 0.93. The measurement of project success utilized a 14-item instrument developed by Aga et al. (2016) and which is adapted based on earlier studies measuring public sector projects' success (Joslin and Müller 2015; Khan et al. 2013), the 14 items instrument works validly in Pakistan (Nauman et al. 2021). The instrument used to measure project success demonstrated a high level of internal consistency, with a Cronbach's alpha reliability coefficient of 0.90. The measurement of team building in this study employed a 6-item instrument

**Table 1 Demographic characteristics of the study respondents.**

Measures	Items	Frequency	%
Gender of respondents	Male	335	76.8
	Female	101	23.2
Age of respondents (years)	25 to 30	122	28.0
	31 to 35	68	15.6
	36 to 40	59	13.5
	41 to 45	96	22.0
	46 to 50	32	7.3
	51 to 55	44	10.1
	56+	15	3.4
Education level (years)	Less than 16	10	2.3
	16	86	19.7
	18	243	55.7
	18+	97	22.2
Experience level (years)	Less than 5	189	43.3
	6 to 10	24	5.5
	11 to 15	25	5.7
	16 to 20	57	13.1
	21 to 25	109	25.0
	26+	32	7.3

developed by (Potnuru et al. 2018), adapted from previous studies by (Aga et al. 2016), Klein et al. (2009), and (Salas et al. 1999). The reliability analysis indicated a high internal consistency, with a Cronbach’s alpha coefficient of 0.91. The project manager’s gender, age, level of education, and experience may affect project success; therefore, these demographic factors were used as controls (Aga et al. 2016; Hijazi, 2021; Turner and Müller, 2005).

**Data analysis.** Data analysis in this study involved the use of several statistical software programs, including SPSS, Amos, and the PROCESS Macro. Confirmatory factor analysis (CFA) was conducted to assess the fit of the observed variables with the hypothesized latent constructs. The results of the CFA, which can be found in Table 3, provide evidence of the appropriateness of the observed variables in representing the underlying latent constructs (Hox 2021). Subsequently, the hypotheses were tested using linear regression analysis and mediation model-4. Linear regression analysis was employed to examine the relationships between the independent and the dependent variables. Mediation model-4 was utilized to assess the mediating effect of the proposed mediator on the relationship between the independent and dependent variables. These analyses helped evaluate the statistical significance and strength of the hypothesized relationships and determine the extent to which the proposed mediator variable influenced the relationship between the independent and dependent variables (see Table 4) (Hayes 2017).

**Results**

**Factor analyses construct reliabilities and validities.** Confirmatory factor analysis (CFA) was utilized to evaluate the suitability of the three-factor model comprising public leadership, project success, and team building. The analysis showed that the three-factor model demonstrated a good fit with the data ( $\chi^2 = 803.16$ ,  $df = 514$ ,  $\chi^2 / df = 1.562$ ,  $CFI = 0.94$ ,  $TLI = 0.92$ ,  $SRMR = 0.03$ ,  $RMSEA = 0.04$ ) than the single factor model, which showed poor fit ( $\chi^2 = 653.58$ ,  $df = 28$ ,  $\chi^2 / df = 23.342$ ,  $CFI = 0.68$ ,  $TLI = 0.53$ ,  $SRMR = 0.09$ ,  $RMSEA = 0.24$ ) (see Table 3). Harman’s single-factor statistics indicated that the highest emerging factor accounted for 32% of the variance, which is below the critical threshold of 40% (Fuller et al. 2016). This suggests that the self-reported data is not significantly affected by common method bias (CMB). The constructs in the study

**Table 2 Descriptive statistics, correlation results, constructs reliabilities, and validities.**

Variable	CR	AVE	Mean	SD	PL	PS	TB
PL	0.91	0.68	3.6358	0.8241	0.74		
PS	0.89	0.63	3.6742	0.7163	0.29**	0.78	
TB	0.92	0.60	3.7517	0.7572	0.28**	0.36**	0.77

The diagonal represents the square root of AVE, while off-diagonal values represent correlations. *N* = 436, *PL* Public leadership, *PS* Project success, *TB* Team building, *CR* composite reliability, *AVE* average variance extracted, *SD* standard deviation. Significance levels are denoted by \*\**p* < 0.01.

demonstrated strong internal consistencies, as confirmed by Cronbach’s alpha values reported in the “Measures” section. Additionally, the composite reliabilities (CR) of all constructs exceeded 0.80 (refer to Table 2), indicating tremendous internal consistency of the study’s constructs (Schennach 2016). The convergent validity of the constructs was assessed using the average variance extracted (AVE). The results indicated that the AVE values were above 0.50, indicating satisfactory convergent validity of the study’s constructs. This suggests that the constructs in the study do not exhibit any issues regarding convergent validity. Fornell and Larcker (1981) approach was utilized to assess the discriminant validities. As shown the square roots of the average variance extracted (AVE) of all the constructs were greater than the correlations among the constructs, this is an indication of discriminant validity. According to the values presented in Table 2 (italicized values along the diagonal), the square root of the AVE for each construct is higher than the correlations between the constructs. This indicates that the constructs possess discriminant validity (Rönkkö and Cho 2022). All these statistics and the directions of correlations (see Table 2) among the study variables encourage us to apply regression for examining the hypothesized relationships of the variables.

**Regression results.** Hypotheses were tested using linear regression and mediation model-4, employing the SPSS PROCESS-MACRO suggested by Hayes (2017). The findings of all the hypothesized relationships are expressed below (see Table 3). When controls were included in the regression analysis (refer to Table 4), public leadership demonstrated a significant positive relationship with project success ( $\beta = 0.26$ ,  $p 0.001$ ), and team building ( $\beta = 0.29$ ,  $p < 0.001$ ), these regression results proved H1 and H2. As revealed in Table 4, the mediating variable team-building was positively associated with project success ( $\beta = 0.28$ ,  $p < 0.001$ ), supporting H3. Thus paths a, b, and c in the model of the study are significantly associated. Baron and Kenny (1986) have argued that when all three paths in a mediation model are significantly related, then there can be mediating effect in the model. The mediation model (Model 4) was utilized with 5000 bootstraps and a 95% confidence interval (CI) to assess the indirect effect of public leadership on project success, mediated by team building. The findings presented in Table 4 indicate a significant indirect effect of public leadership on public project success through team building ( $\beta = 0.12$ ,  $p < 0.001$ ). Using the guidelines of Hayes (2017), the upper and lower bounds of bootstraps intervals do not enclose 0 [0.25, 0.48], which concludes that the mediating effect is significant. The influence of public leadership on project success has reduced but was still significant, which shows that there is a partial mediation, thus H4 was supported. The indirect effect was also verified through Sobel’s test (Abu-Bader and Jones 2021), the values of the product of coefficient were ( $SE = 0.04$ ,  $t = 3.06$ ,  $p < 0.001$ ), all these supporting H4. Thus, all the hypothesized relationships of the study H1, H2, H3, and H4 received support from the empirical analyses.

**Table 3 Model Fit Indices.**

Model (M)	Specifications	$\chi^2$	df	$\chi^2 /df$	CFI	TLI	SRMR	RMSEA
M1	CFA results	653.58*	28	23.342	0.68	0.53	0.09	0.24
M2	CFA results	803.16***	514	1.562	0.94	0.92	0.03	0.04

\*P < 0.05 and \*\*\*P < 0.001.

**Table 4 Regression results.**

Path		Effect ( $\beta$ )	SE	t		
Controls						
Gender		Project success	0.05	0.07	-0.73	
Age		Project success	0.02	0.05	0.38	
Education		Project success	-0.01	0.08	0.14	
Experience		Project success	-0.17	0.09	-1.82	
Main effects						
Public leadership (PL)	→	Project success	0.26***	0.05	5.21	H
Public leadership	→	Team building	0.29***	0.08	3.63	H1
Team building (TB)	→	Project success	0.28***	0.06	4.68	H2
PL→TB	→	Project success	0.12***	0.04	3.09	H3

Note (s): N = 436, N represents the number of respondents, x is the interaction term, PL→TB represents the mediating impact of PL on project success through team-building. \*\*\*p < 0.001 denotes significance levels. These results were generated at 5000 bootstraps and a 95% confidence level.

**Discussion**

This research planned to examine the influence of public leadership on project success and team-building and to investigate the influence of team-building on project success. The study also intended to observe the influence of public leadership on project success through the intervening mechanism of team building. Findings show that public leadership is positively related to project success. That is the increased perceptions of the characteristics of public leadership increased the perceptions of project success. This finding is justifiable because earlier literature has also reported that mainstream managerial leadership styles including transformational-leadership (Fareed and Su 2021), and humble leadership (Ali et al. 2020a, 2020b) influence project success in Pakistan. Similarly, despotic leadership (Wang et al. 2021) and servant leadership (Cleary-Hardy, 2021) styles also influence project success in other countries’ contexts. Tummers and Knies (2016) argued that “public leadership is a public sector-specific transformational leadership style”, given the established positive effects of mainstream transformational leadership, it is reasonable to expect that public leadership is also associated with project success in public agencies. The finding is justifiable because previous empirical literature has noted that this leadership approach is positively related to project effectiveness (Zada et al. 2023), teachers’ professionalism and public schools’ effectiveness (Kocak and Bozkurt Bostanci 2020) and public servants’ motivation and service performance (Schwarz et al. 2020). The findings also revealed that public leadership positively influences team building. That is the characteristics of public leadership influence the perceptions of team-building. This finding is justifiable because earlier studies have discussed the effect of leadership behaviors on team-building in general (Kastrup 2019) and specifically project team building as well. The existing empirical research regarding managerial leadership and team-building is reported both from Pakistan and other countries’ contexts as well (Grynchenko et al. 2018; Nauman et al. 2021; Smith 2001). Moreover, previous empirical research has also reported that public leadership improves civil servants’ attitudes and behaviors including commitment, engagement, service performance, citizenship behavior, and orientations toward change (Tummers and Knies 2016). Based on our empirical findings and previous

outcomes of public leadership, we conclude that public leadership significantly engenders team building. This study has also found that project team-building significantly affects project success. That is the team members’ perceptions of team building influence the perceptions of project success. This finding is following earlier studies (Ali et al. 2021; Nauman et al. 2021). This finding from the project context of Pakistan generalizes the earlier findings by strengthening our beliefs in the relationships between these variables. Moreover, this study has also concluded that team-building acts as a mediating mechanism between public leadership and project success. Previous studies have also reported that team-building intervenes between mainstream leadership behaviors and project success (Ali et al. 2021; Nauman et al. 2021). Previous studies also reported that public leadership improves public agencies’ effectiveness by engendering the civil servant’s professionalism (Kocak and Bozkurt Bostanci 2020) and service performance through the intervening mechanism motivation (Schwarz et al. 2020). Drawing from these previous studies, we can conclude that there is a significant relationship between public leadership and project success mediated by team building.

**Implications.** This study contributes to the existing literature by providing valuable theoretical implications. Firstly, there is scarce empirical research regarding the relationships between mainstream managerial leadership behaviors and specifically public sector project success (Fareed and Su 2021; Santos et al. 2020). Secondly, public leadership is a relatively new concept that has received limited empirical research attention about its impact on employees and organizational outcomes (Tummers and Knies 2016; Vogel et al. 2020). The first significant implication of this scholarship is the establishment of an explanatory connection between public leadership and project success. Thus, this scholarship extends public leadership to public sector project management. The discipline of public management has a scarcity of literature on team-based research, as highlighted by Chin (2015). Specifically, there is a dearth of empirical studies examining the relationship between public sector-specific leadership approaches, such as public leadership, and team building within public agencies. The second theoretical implication of the scholarship is



exploring empirical evidence between public leadership and team-building. This finding also extends the public leadership concept to team-based research in the discipline of public management. More, some earlier studies show that team building is related to project success (Nauman et al. 2021). However, a recent systematic review study highlighted that the empirical findings of team building are not very consistent with organizational outcomes (Kastrup 2019). This study found a significant connotation between team-building and project success, which enhances the stability of the existing empirical findings. This finding strengthens believing that team-building is an important CSFs of public sector projects. Moreover, this research adds to the existing literature by demonstrating that public leadership has not only a direct impact on project success but also an indirect impact mediated by team building. Thus, the results of our study have importance regarding researchers' interests in identifying outcomes of public leadership, critical success factors of projects, and team-based research in the public context.

This study holds practical significance in the context of public sector projects. These projects undergo approval and funding by political governments, and planning and execution by relevant agencies. Project managers and their teams oversee them in the socioeconomic interests of the public. The success of these projects is desired by all stakeholders, with a focus on efficient completion, desired impact, organizational benefits, and the satisfaction of key stakeholders (Santos et al. 2020). Based on the empirical results, it is highly recommended that key stakeholders, including project managers, prioritize the development of effective team-building practices. This is crucial for ensuring the successful completion of projects. Effective project team building necessitates active participation and collaboration among team members to establish and attain shared goals. It involves clarifying individual roles, promoting shared responsibilities, and adhering to organizational norms. Additionally, fostering strong interpersonal relationships and enhancing problem-solving skills are essential components of successful team-building efforts (Aga et al. 2016; Kastrup, 2019). Human resource (HR) departments and project managers in public agencies can enhance team building by implementing a wide range of training and development initiatives. Moreover, our results indicate that the attributes of public leadership influence project success and team building. Based on these findings, we encourage public project planning and executing agencies to ensure leadership attributes of accountability, rule-following, political loyalty, and network governance in public sector project managers, as these leadership attributes manifest in the form of desirable employees and organizational outcomes including project team building and project success. Public project managers are highly encouraged to practice accountability, rule-following, political loyalty, and network governance leadership attributes more often than usual as these lead to project team building and project success. HR departments are encouraged to recruit civil servants with high tendencies toward practicing accountability, rule-following, political loyalty, and network governance characteristics. Public employees possessing these characteristics are more likely to contribute to the successful implementation of public sector projects. Additionally, employees with such qualities contribute to effective team building, which ultimately leads to project success.

**Limitations of the study and future research directions.** We collected data from the study using the commonly accepted self-reporting descriptive survey method. This method has both strengths and weaknesses. The key strength of this procedure is that it facilitated us in collecting data from 436 public project

managers and their subordinates conveniently. Responding to self-report measures allowed us to measure public leaders' opinions of project success and team building, and sub-ordinates civil servants' perceptions of the public leadership attributes. The key limitation of employing self-reported instruments is social desirability bias, as the respondents are likely to report their leadership, team building, and project success in a biased way. Anyway, the potential risk of bias was mitigated through a continuous emphasis that the aim of the study is purely academic and that all the responses to the measures of the study are kept confidential. Secondly, self-reporting measures sometimes cause common method bias (CMB) (Jakobsen and Jensen 2015). The risk of CMB was mitigated by accumulating data from two sources, as the project managers have responded to the measures of project success and team building, while sub-ordinates have measured project managers' public leadership attributes. Moreover, Harman's single-factor statistics have shown that the data has lack CMB. In future research, it is recommended to collect data using the same self-reporting measures at different time intervals to enhance the validity and stability of the relationships between the variables. The present results are produced at the variable level of the model, however, the dimensions of public leadership including AL, RL, LL, and NL may influence the dimensions of project success (e.g. project efficiency and stakeholders satisfaction) and team-building (e.g. goals setting, roles clarification, interpersonal relationships, and problems solving) differently. Future studies can delve into the specific dimensions of the variables to gain deeper insights into the phenomenon; as well, a mixed-method approach can be employed to further validate the findings of the research model and enhance the robustness of the results.

## Conclusion

This study aimed to observe the influence of public leadership on project success and team building and to test the influence of team building on project success. The investigation also intended to test the influence of public leadership on project success through the mediating mechanism of team building. Data was collected from project managers and their immediate subordinates in the public management context of Pakistan. Results revealed that public leadership improves project success and team building, and that team building improves project success. Results also revealed that public leadership engenders team building which ultimately improves project success.

## Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding authors on reasonable request.

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### Author contributions

NUK, PZ and HH conceptualized the research idea; NUK, HH and AAM conducted the surveys and performed the analysis; NUK and AAM wrote the first draft of the manuscript; all authors critically discussed the results, revised the manuscript and have read and approved the manuscript.

### Competing interests

The authors declare no competing interests.

### Ethical approval

This research adheres to the ethical standards and guidelines outlined in the Helsinki Declaration of 1964 and its subsequent amendments. To the best of our knowledge, all of the research procedures were performed within these ethical standards. Formal approval was obtained from the competent authorities, including the Graduate Committee of the School of Public Administration, Central South University, China, and the Secretary of the Planning Department, Khyber Pakhtunkhwa Province, Pakistan. Informed consent was obtained from all participants, and they were fully informed about the purpose, procedures, and benefits of the study. Confidentiality, privacy, and anonymity were strictly maintained throughout the data collection and analysis process. We affirm our commitment to upholding ethical principles in research and are ready to provide any additional information upon request.

### Informed consent

Informed consents were obtained in June 2021 from the study participants, including project managers and their immediate subordinates. All the participants were accessed with the support of the Secretary (Head) of the Planning Department, Khyber Pakhtunkhwa Province, Pakistan. Response Participants were provided with comprehensive information regarding the study's purpose and procedures. Confidentiality and privacy safeguards were strictly implemented throughout the research process.

### Additional information

**Supplementary information** The online version contains supplementary material available at <https://doi.org/10.1057/s41599-023-01791-y>.

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