

Principals' systems thinking attribute: exploring a principal–middle leader relational demography perspective

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Pascale Benoliel

School of Education, Bar-Ilan University, Ramat Gan, Israel

Haim Shaked

Hemdat Hadarom College of Education, Netivot, Israel, and

Nehama Nadav and Chen Schechter

School of Education, Bar-Ilan University, Ramat Gan, Israel

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Abstract

Purpose – Relying on information processing and attribution theories, which relate to the formation of leadership perceptions and attributes, the current study seeks to examine the relationship between demographic variables and principals' systems thinking (PST) in an integrated model. The present study purpose was threefold: first, the study seeks to examine whether attributions middle leaders make about PST may show substantial and systematic variance in a management team. Second, the study seeks to investigate the influence of principal–middle leaders' relational demography variables (gender, education and tenure) (dis)similarity on middle leaders' PST attribute. Finally, the study seeks to explore the moderating role of duration of principal–principal–middle leader acquaintance in the relationship of demographic (dis)similarity to PST.

Design/methodology/approach – Data were collected from 305 dyads (middle leaders and their principals) from 101 schools. MANOVA analysis and hierarchical regression analyses were used to test the hypothesis.

Findings – Findings showed that it is both appropriate and important to examine group-level effects when studying PST effects. Also, PST levels were higher in gender-similar relationships than in gender-dissimilar ones. Finally, duration of acquaintance was found to moderate the relationship between principal–middle leaders' gender (dis)similarity and PST appraisal.

Originality/value – Focusing on principal–middle leader relationships, which are explicitly relational, with a consideration for level relationships may potentially highlight the need to consider multiple levels of analysis in order to understand how PST attribution occurs. This focus can help us to capture the core of PST social dynamics among the dyad, as well as highlighting the distinction, if any, between in-groups and out-groups. Acknowledging that school faculty are motivated by their interpersonal relationships with their principals and how such relationships are contingent upon demography (dis)similarity and the duration of acquaintance between dyads may help to broaden the understanding regarding potential antecedents of middle leaders' PST attribution and its implication for school organizations.

Keywords Principals, System thinking, Middle leaders, Relational demography similarity

Paper type Research paper

Introduction

Principal systems thinking (PST) emphasizes understanding the system as a whole before studying its parts, while simultaneously considering an array of influencing factors (Shaked and Schechter, 2017). PST has become a focus of research and practice. PST includes four major activities, namely *adopting a multidimensional view*, *openness to a variety of opinions*, *leading wholes* and *evaluating significance*, through which principals apply systems thinking (ST) in their schools. Several studies have demonstrated how PST can yield a number of positive effects, including school change and effectiveness as well as improved attitudes toward their job among teachers (Benoliel *et al.*, 2019; McGurk and Pearson, 2018; Nadav *et al.*, 2020; Shaked *et al.*, 2018). Yet, educational leadership research has stressed that leadership is not solely embedded in formal roles but often emerges from relationships between



individuals (Lu and Hallinger, 2018). In this regard, principals have increasingly come to rely on teams, senior management teams (SMT), which typically consist of teachers performing leadership roles, such as middle leaders (e.g. deputy heads and grade-level coordinators) for support (Rosenfield *et al.*, 2018).

This increased reliance on middle leaders and SMTs in school organizations (Sleegers *et al.*, 2018) points to a school social context, involving individuals (e.g. teachers and middle leaders) embedded within dyadic relationships (e.g. middle leaders and principals), and dyadic relationships embedded within larger sub-groups (e.g. SMT, school) that shape the school social structure. In fact, contemporary definitions of leadership advance a view of the phenomenon as relational where the locus of leadership is not solely in a leader or solely in followers, but rather, leadership is conceptualized as a dyadic, shared, relational and complex social dynamic (Avolio *et al.*, 2009; Crawford, 2016). More importantly, the rise of interest in interpersonal relationships in educational settings that position school leadership as inherently relational (Kruse, 2018) offers a rich opportunity to explore PST across multiple levels.

Research has shown that the dyadic relationship between employees and their leaders plays a significant role in shaping important follower attitudes and behaviors (Dulebohn, *et al.*, 2012). The leader–member exchange (LMX) theory is defined as the quality of the working relationship between a follower and his/her immediate leader (Dansereau *et al.*, 1975). LMX views leadership as being fairly heterogeneous across employees within a work unit. Recently, researchers have proposed a group-level LMX differentiation, relative LMX (RLMX), which reflects the difference between the individual's appraisals from average leader–subordinate LMX in the work group (Sun *et al.*, 2020). In contrast, more traditional leadership theories, such as average leadership style (ALS) or group-focused leadership, view leadership as being fairly homogeneous across employees within a work unit (Schriesheim *et al.*, 1998). These levels of analysis may represent alternative ways of viewing ST; yet, each may have some validity depending on the particular variables and circumstances under investigation. Accordingly, the present research proposes a multilevel perspective for the PST attribute that integrates the dyadic perspective with group- and individual-within-group level perspectives to provide a more complete picture regarding the relationship between relational demography principal–middle leader (dis)similarity and the middle leader PST attribute.

We focus on middle leaders' attributions about PST for three reasons. First, as a result of school systems having been utterly reshaped by the demands of outcome-based accountability, middle leaders have come to acquire numerous administrative and management duties with close interactions with their principals, either as individual school members or as SMT members or both (Benoliel, 2018). Second, research has stressed that followers' attribution is influenced more by the quality of the relationship as the followers perceive they have with their leaders than as perceived by their leaders (Sun *et al.*, 2020). Third, we answer Martinko *et al.*'s (2011) call to devote more attention in research to how attributions about behavior influence the attributor's responses to the behavior of, in the present study, the middle leader.

Our purpose is therefore threefold. First, relying on information processing and attribution theories, which relate to the formation of leadership perceptions and attributes (Hall and Lord, 1995; Lord and Maher, 1993), we examined whether attributions middle leaders make about PST may or may not show substantial and systematic variance in an SMT. Second, research has shown that demographic similarity between individuals at work is associated with individuals attribution about leadership (Dulebohn *et al.*, 2012). Accordingly, drawing upon the similarity-attraction paradigm (Byrne, 1971), the second purpose of the study is to investigate the influence of principal–middle leaders' dyadic relational demography variables (gender, education and tenure) and (dis)similarity on middle

leaders' PST attribute. Finally, since the effect of demographic (dis)similarity might vary as a function of the duration of leader–follower interaction as relationships develop over time (Zacher *et al.*, 2015), we seek to investigate the moderating role of duration of principal–middle leader acquaintance in the relationship of demographic (dis)similarity to principal–middle leaders' PST attribute.

Such an investigation can make several important contributions. Despite the positive influences of ST in work settings, few empirical studies have been devoted for investigating and incorporating multiple levels of analysis when studying the PST attribute. Focusing on principal–middle leader relationships, which are explicitly relational, by relying on theories of leadership perception and attribution with a consideration for level relationships may potentially highlight the need to consider multiple levels of analysis in order to understand how PST attribution occurs. This focus can help us to capture the core of PST social dynamics among the dyad, as well as highlighting the distinction, if any, between in-groups and out-groups. This offers the possibility of opening a new avenue for researchers when studying PST, especially within an educational context emphasizing the contribution of team-based management as an effective means for school management and improvement and characterized by nested data (Benoliel, 2018). Moreover, leader–follower relationships constitute one of the most important interpersonal interactions in the workplace (Dulebohn *et al.*, 2012); understanding the PST attribute in the dyad is thus critical for enhancing positive outcomes for both middle leaders and schools. Thus, acknowledging that middle leaders are motivated by their interpersonal relationships with their principals and how such relationships are contingent upon demography (dis)similarity and the duration of acquaintance, may help to broaden our understanding regarding potential antecedents of middle leaders' PST attribution and its implication for school organizations. This is especially significant in light of the fact that educational leadership research tends to consider relational variables as control variables, ignoring their important potential influence on leadership effects and attributes. The research findings may thus contribute to the literature on the dynamics of the PST as a leadership framework for schools.

Theoretical background and hypotheses

PST in schools: exploring a multilevel perspective

Schools involve increasingly interconnected professional networks based on relationships resulting in an increased complexity of school work (Nguyen *et al.*, 2019). PST is a holistic approach which serves as an important framework for understanding wholes, their parts and how they interact (Shaked *et al.*, 2018). In contrast to the prevailing reductionist approach that attempts to understand systems by breaking them down into sub-systems, PST focuses on the emerging organizational properties created by the ongoing interactions among the system's components. A growing body of research shows that PST offers a variety of potential benefits to the overall school organization and to its employees. In this regard, PST was found to create a positive work environment for school staff facilitating job satisfaction and organizational commitment (Benoliel *et al.*, 2019; Nadav *et al.*, 2020).

Shaked *et al.* (2018) identified four activities of PST through which effective principals apply ST in their schools: (1) *adopting a multidimensional view* which includes understanding that since each element is part of the large and complex school system, it necessitates contemplation in terms of the motivations and implications that have led to a certain event. (2) *Openness to a variety of opinions* which includes involving teachers in decision-making and listening to opposing perspectives, which opens up additional ways of thinking. (3) *Leading wholes* which involve seeking solutions that influence the entire workplace environment, identifying recurring patterns and viewing multiple perspectives. (4) *Evaluating significance* which includes identifying small events that have significant implications for the entire

system, making decisions in accordance with school goals and using a variety of perspectives to reach a decision.

Despite the positive influences of PST in work settings, few empirical studies have been devoted for investigating and incorporating multiple levels of analysis when studying the PST attribute. Attributions, i.e. an individual's explanation regarding the reasons for people's behavior (Kelley, 1972), play an important role in followers' perceptions and reactions to a leader's activity (Martinko *et al.*, 2011). According to information processing theories of leadership, followers cognitively organize and convey information related to their leaders and their leaders' environments according to their perceptions and cognitive categorizations of leadership behaviors, which in turn influence the attributions they make about their leaders (Hall and Lord, 1995; Lord and Maher, 1993). Followers' perceptions of their work environment are thus influenced by social cues; through shared perception, they perceive the attitudes and needs suitable to their work environment and the appropriate reactions and behaviors (Salancik and Pfeffer, 1978). However, research has shown that since individual team members remain exposed to similar leadership activities, policies and standards, leader activities also influence the team's shared perceptions (Epitropaki *et al.*, 2013). Therefore, the base for attributions followers make about the leader may not be inherently at the individual level but may also reflect phenomena at the dyadic or group level as well.

These notions are also reflected in the LMX and group-focused approaches to leadership. The group-focused approach proposes that the same group members will show agreement (homogeneity) regarding leadership attributes (Dansereau *et al.*, 1999). Members of an organizational unit who work for the same leader are homogeneous in perceptions, understandings, responses and behaviors and can therefore be considered a single entity. Accordingly, the group, viewed as a single, whole entity with respect to the leadership attribute, may offer a context within which attributes of PST are formed. In referring to multiple levels of analysis, according to these assumptions the leader's behavior is measured by being averaged across the unit members' responses to an instrument, such as their behavior (Rousseau, 1985).

However, when there is little agreement among group members, the lower-level units (dyads or individuals) within the group are differentiated. Consistent with this concept, LMX theories propose that different followers are exposed to dissimilar perceptions because of their in-group or out-group status, (e.g. within-group variation in leadership) (Dansereau *et al.*, 1999), that result in a nonhomogeneity assumption across employees within the same work unit. According to this perspective, leaders develop different relationships with different members of the same group (Schuh *et al.*, 2018). From a level perspective, this represents a dyadic perspective because it depends on the way each one perceives the other. More recently, researchers have advanced the proposition that group-level LMX differentiation may be necessary as well; relative LMX (RLMX) reflects the difference between the individual's appraisal from average leader-subordinate LMX in the work group distinguishing social relationships within a work unit as the motive behind followers' reciprocal behaviors (Sun *et al.*, 2020). These perspectives are of particular importance in followers' self-report studies in which principal leadership is operationalized as middle leaders' attributes of their principals' behaviors (Benoiel, 2018; Uhl-Bien *et al.*, 2014).

The present study focuses on middle leaders' attributes of PST. Accordingly, the individual-level influences include characteristics of a single middle leader, dyadic-level influences occurred within principal-leader pairs, and the group-level influences refer to middle leaders members of SMT sharing the same leaders, i.e. the principal. PST encompasses activities that are characterized by *evaluating the significance* of several events as well as demonstrating *openness to a variety of opinions*. PST thus involves collaborative thinking between principals and middle leaders in which principals consult middle leaders for their ideas and recommendations on school-level issues. Consequently,

since each middle leader, as a member of an SMT, may have a different functional background as well as different pedagogical and administrative expertise from a variety of domains (Benoliel and Somech, 2016). Principals are likely to develop different relationships with them with implications for the PST attribute.

However, PST also involves the principal activities of *adopting a multidimensional view* and *leading wholes*. It is characterized by an emphasis on a comprehensive big picture of the situation, systemic standard, shared values and challenging of the status quo of the organization (McGurk and Pearson, 2018). Principals displaying ST are thus more likely to influence an SMT as a whole than individual members due to their emphasis on common commitment to the school' aspirations, values and goals, as well as shared decision-making (Shaked *et al.*, 2018). In addition, following information processing and RLMX theories, middle leaders are likely to share knowledge regarding how the principal treats them. Therefore, PST activities directed toward one middle leader will likely be evaluated in light of the group context (SMT) of the PST activities toward other middle leaders. Accordingly, our first goal is to assess whether the variability in the PST attribute is primarily at the individual level of analysis, such that each middle leaders' PST attribute tends to be separate and unique from other middle leaders of the same SMT, or whether the variability of middle leaders' PST attribute is at a team level of analysis, such that middle leaders who routinely come into contact with each other tend to have similar attribution of PST.

Principal–middle leaders' relational demography (dis)similarity and PST appraisal

The literature emphasizes the followers' characteristics, such as relational demography, as important variables in explaining follower attributes and attitudes toward their leader (Graham *et al.*, 2018). First, presented by Tsui and O'Reilly (1989, p. 403), relational demography investigates "the comparative demographic characteristics of members of dyads or groups who are in a position to engage in regular interactions". Relational demography draws upon the similarity-attraction paradigm (Byrne, 1971) and self-categorization theories (Tajfel and Turner, 1986) to understand the mechanisms behind employee responses to (dis)similarity indicating that interpersonal outcomes are the natural results of demographic (dis)similarity between members of a dyad. The social categorization theory describes how and when individuals define themselves as individuals and/or team members, which may affect their self-perception ("I" to "we") and behavior, and which may accentuate the perceived similarity of the target to the relevant in-group or out-group (Hogg *et al.*, 2017). Accordingly, the second aim of this study is to investigate the influence of principal– middle leaders' relational demography variables (gender, education and tenure) (dis)similarity on the PST attribute.

PST encompasses interpersonal interactions between principals and school faculty members, which may vary among dyads and/or groups, since it involve social exchange through knowledge exploration and exploitation (Rallis and Lawrence, 2018). Principals who display ST activities encourage a more cooperative approach, giving school faculty more responsibility for school improvement based on a deeper understanding of the school system (McGurk and Pearson, 2018). Relational demography posits that more similarity with respect to demographic characteristics (e.g. gender, education and tenure) between individuals in a dyad or in a work group makes it more likely that positive outcomes will emerge (Bakar and McCann, 2014). By being demographically similar, there is an inherent supposition between dyads that they also share similar opinions and principles; individuals tend to cultivate "expectation states", which include an implicit process according to which employees perceive how they should function to achieve dyadic goals. Accordingly, we propose that demographic variables of gender, education and tenure directly shape the social context and dynamic between principals and their middle leaders, influencing the middle leaders' PST attribute.

Gender. Dyadic gender composition influences how a person perceives and evaluates its coworker and leaders and has been related to interpersonal interactions and several workplace attitudes (Berkovich, 2018). Since individuals commonly refer to visible attributes such as gender, to form the basis of their evaluations of and beliefs about the characteristics of others, dyadic gender composition plays a key role in determining the beliefs and expectations of principal–middle leaders’ interpersonal interactions (Phillips *et al.*, 2009) and therefore may influence PST attribute. The female leadership style has been characterized as collaborative and supportive, with interpersonal relationships that are collegial and caring, promoting cooperation over competition, and tending to solve problems through negotiation and compromise (Sebastian and Moon, 2017). PST involves activities that are characterized by a more participatory (e.g. openness to a variety of opinions and adopting a multidimensional view) and interactive approach (e.g. leading wholes and evaluating significance), enhancing interpersonal relationships which may more reflect a female leadership approach. In contrast, the male leadership style typically includes characteristics such as determination, aggression and self-confidence (Eagly and Carli, 2003).

Educational organizations are commonly female-dominated organizations. Thus, female/female principal–middle leader dyads are more common than male/male dyads. Accordingly, female principals are less perceived as atypical and are not seen as occupying an incongruent role (Eagly and Karau, 2002). Therefore, female PST activities as perceived by their middle leaders may be influenced by the inclination of same-gender evaluators to evaluate their actual leadership activities. However, principal–middle leaders’ gender dissimilarity may evoke disagreements over ideas (Phillips *et al.*, 2009). Thus, following the relational demography perspective, this study suggests that for same-gender dyads, a higher level of PST may be expected but in the case of gender dissimilarity, middle leaders may categorize themselves as being different from their principals and may therefore be more likely to attribute lower levels of PST.

Education. In line with relational demography and similarity-attraction paradigm theory, dissimilarity among dyads with respect to education level is often correlated to divergence between individuals regarding their values, experiences and beliefs. Therefore, there is less opportunity for communication and higher intellectual and emotional distance among the dyad is experienced (Tsui and O’Reilly, 1989). However, PST is characterized by a willingness to learn from others’ opinions. Yet, research has shown that status differences between principals and middle leaders are more legitimate (Bauer and Erdogan, 2015). Therefore, it may be more easily accepted for middle leaders to work with a principal more experienced and more educated than them. However, at the same time, because of such dissimilarity middle leaders may be more likely to feel distanced and therefore might be more reluctant to communicate openly, confidentially and frequently with their principals. The resulting reduction in mutual identification and trust (Tschannen-Moran and Clement, 2018) would make it harder for the PST activities to come through even if the principals would engage in discussion, or seek innovative and creative ideas for finding holistic solutions to improve the school system.

Furthermore, a potentially negative dynamic could form in dyads in which the leaders are less educated than the followers (Tsui and O’Reilly, 1989). Leading middle leaders who are more educated may be a more challenging task for principals due to the greater degree of threat to their authority that the disparity in educational level might bring about (Bauer and Erdogan, 2015). Part of this negative dynamic could be attributed to the follower’s perception that the leader is not competent, making it more difficult to develop trust (Tschannen-Moran and Clement, 2018). Therefore, middle leaders lacking any identification with a principal may not respond to the PST and may fail to identify principals’ willingness to share thoughts, experiences and reflections. Accordingly, education dissimilarity may result in lower levels of PST attribute.

Tenure. Organizational tenure refers to the length of time that an individual employee has worked for the organization (Wang *et al.*, 2012). Tenure is critical in the development of common values and social relationships. Research has shown that tenure dissimilarity within leader–follower dyads is correlated to followers' attitudes and behaviors (Tepper *et al.*, 2011). Individuals who are similar in term of tenure are likely to share the same perceptions and understandings regarding several organizational procedures, norms and values and are more likely to spend more time together (Eisenberger *et al.*, 2014).

PST involves evaluating significance of events that require treatment, openness to external opinions and to change, with discussions that involve the educational staff in decision-making. Research showed that common understandings are more likely to evolve over time (Eisenberger *et al.*, 2014). The tenure similarity among principal–leader dyads implies that dyads are more likely to be frequently involved during the course of their work in events and procedures that seek to facilitate school mission success with positive implications on the relationships among the dyad members. Since PST has been correlated to subject coordinator and organizational commitment (Benoliel *et al.*, 2019), similar middle leaders in term of tenure may already maintain positive attribute with their principal. Hence,

- H1. Demographic (dis)similarity in (a) gender, (b) education and (c) tenure is correlated with the PST attribute, such that the higher the similarity between the principal and the middle leader, the higher the level of PST.

Duration of acquaintance as a moderator in the relationship of demographic (dis)similarity and PST

Several scholars have suggested that the duration of leader–follower interaction moderates the effects of demographic dissimilarity such that the influences of relational demographic variables weaken as the duration of acquaintance between dyad members increases (Van der Heijden, 2018). According to the social influence approach, similarity may be cultivated over time, as dyad members learn more about each other and accommodate themselves to each other's characteristics. As relational identities develop, the nature of social exchanges changes to an act-by-act base and dyad members may become more motivated toward the quality of the relationship (Avery *et al.*, 2012). Since interpersonal relationships change over time (Van der Heijden, 2018), duration of relationship between principal and middle leaders may be an important factor in moderating the influences of demographic (dis)similarity in the PST attribute.

Principals who perform ST activities focus on developing a vision, creating a common mission and promoting staff development (Shaked and Schechter, 2020), which are continuously coconstructed and developed over time in a dynamic and systemic way. Research shows that as time goes by, dyad members become more and more involved in activities that satisfy dyad members' goals, facilitating both goal achievement and workplace satisfaction and well-being, with positive implications for how dyad members perceive each other (Koestner *et al.*, 2012). By working cooperatively with their middle leaders through the academic year, principals can share more responsibility for school improvement with their middle leaders based on a deeper shared understanding of the school system (McGurk and David Pearson, 2018). Hence,

- H2. Duration of acquaintance and demographic dissimilarity interact in their effect on the PST attribute, such that the negative relationship between demographic dissimilarity and PST is stronger in short principal–middle leader relationships than in longer relationships.

Method

Research setting

The current study investigated Israeli school middle leaders. The Israeli national school system serves more than two million students (nearly 5,000K–12 schools), with approximately 73% in the Jewish sector and 27% in the Arab sector. The Jewish sector consists of state schools (58%), state-religious schools (19%) and separate independent ultraorthodox religious schools (23%). The Arab sector consists of Arab schools (71%), Bedouin schools (22%) and Druze schools (7%). About 1% of the total student population is enrolled in special-education settings (Israeli Central Bureau of Statistics, 2016). The Israeli educational system has traditionally been highly centralized both structurally and procedurally. The current study is based on the responses of Jewish educators working in state-secular and state-religious schools which represent the two largest components of the educational system.

Participants and procedure

Data collection was performed in several steps. After the research project was approved by the Israeli Ministry of Education, schools were randomly selected from a list of elementary schools provided by the Ministry of Education. We first contacted the principals, explaining the study's purpose and emphasizing the importance of candid answers. Data were collected from a sample of 305 middle leader SMT members from 101 elementary schools randomly chosen in Israel (305 dyads). Middle leaders and principals participated voluntarily. Middle leaders completed questionnaires on their principals' ST. Both principals and middle leaders provided demographic information. Anonymity for participants was guaranteed, and the significance of candid answers was stressed.

A total of 500 questionnaires were distributed to middle leaders from 118 schools. After data collection was completed, we were able to match 305 dyads from 101 schools indicating a response rate of 61%. However, since duration of acquaintance data was not available for all of the dyads, the sample size involved in the actual regression analyses was 127 dyads. School size was based on the number of enrolled students with an average mean of 419.06 students ($SD = 177.137$) per school. The principals (59.7% women) had a mean tenure of 9.32 years in their current school ($SD = 7.48$) and at least a bachelor's degree (16.52%), with 79.4% holding a master's degree and 3.4% holding a doctorate. Middle leaders (57.1% women) had a mean age of 38.89 years ($SD = 7.48$) and mean job tenure in the profession of 12.38 years ($SD = 7.44$), with 71.7% holding a bachelor's degree, 27.3% holding a master's degree and the remaining 1.0% holding professional certification degrees. Teaching tenure ranged from 1 to 38 years ($M = 12.38$, $SD = 7.44$). On average, three to five middle leaders answered the questionnaire for each school ($M = 3.02$, $SD = 1.79$). These sample characteristics are roughly representative of the Israeli educational workforce (Israel Central Bureau of Statistics, 2015).

Measures

Relational demography. Demographic dissimilarity was measured in terms of gender, educational level and organizational tenure. Relational scores were derived by using the absolute differences between principal and middle leader scores. Tenure discrepancies were created by subtracting middle leaders' time of organizational tenure from those of their principals. Gender was dummy coded for each middle leader and for each principal, with 1 representing men and 2 representing women. Education was coded 1 for bachelor's degree, 2 for master's degree, 3 for PhD and 0 for other degree. Educational and gender discrepancy were the absolute difference between principal's and middle-leader's responses. For all the relational variables, a higher score indicated greater dissimilarity.

Principals' systems thinking. To assess the frequency at which a principal displayed ST activities, middle leaders answered the 17-item PST scale validated for schools by [Shaked](#)

et al. (2018). PST includes four ST activities, the CFA indicated good goodness-of-fit indexes, $\chi^2(108) = 262.159$, CFI = 0.904, IFI = 0.907 and RMSEA = 0.059, (e.g. “The principal tends to take unexpected occurrences into account”, $\alpha = 0.85$). Based on CFA: (a) *evaluating significance* (e.g. “The principal tends to take unexpected occurrences into account”, $\alpha = 0.66$); (b) *openness to a variety of opinions* (e.g. “The principal engages in dialog with those holding educational outlooks that differ from his/her own”, $\alpha = 0.70$); (c) *leading wholes* (e.g. “The principal attempts to identify repetitive patterns in the information at hand” ($\alpha = 0.60$)) and (d) *adopting a multidimensional view* (e.g. “During decision-making, the principal tends to view the entire picture before examining its details”, $\alpha = 0.66$). Middle leaders rated the PST activities on a five-point Likert scale ranging from *never* (1) to *always* (5).

Duration of acquaintance. This was measured in number of years the principal and the middle leader had worked together. The duration of their relationship ranged from 1 to 26 years with an average of 7.558 ($SD = 5.689$).

Control variables. School size was included as control variable because the literature has noted its role on a leader–follower relationship and because researchers generally concur that the organization’s structure is correlated to workers’ leadership attribute (Yukl, 2012). Organization size data were drawn from information obtained from the archives and school administrations. The number of students at each school was noted as a measure of organization size.

Level of analysis

We calculated within-group inter-rater reliability rWG (Lindell and Brandt, 1999) to investigate the level of within-group agreement. In the current study, rWG represents the extent to which these groups of middle leaders give the same or very similar ratings to the PST scale items. Unlike intraclass correlation coefficient (ICCs) procedures, which analyze data according to a contrast of within-group variance to between-group variance, the rWG index does not depend on between-group variance. The rWG index considers the within-group variability and contrasts this variability to the variability expected due to random responding. Theoretically, Rousseau (1985) advocated the use of composition theories specifying the functional similarities of constructs at different levels. Middle leaders are expected to share the same perceptions as school members of their environment; perceptions of work environment, team’s task characteristics or patterns of behaviors. High within-group agreement would justify using the team average as an indicator of team-level variables (rWG: James *et al.*, 1993). For the PST dimensions of *leading whole*, *evaluating significance*, *adopting a multidimensional view* and *openness to a variety of opinions*, rWG were 0.79, 0.85, 0.88 and 0.87, respectively, indicating reasonable within-group agreement.

ICCs were used to evaluate group-level properties of data (Bliese, 2016). The ICC(1) coefficient estimates inter-rater reliability or the amount of variance in individual level responses that can be explained by group level properties and is not influenced by group size or by the number of groups (Bliese, 2016). If there is little variance to be explained at the group level, group-level analyses are unnecessary, and relationships should be viewed at the individual level of analysis. James (1982) recommended a cutoff point of 0.12. An ICC of 0.20 is considered moderate, and ICCs of 0.30–0.40 are considered high (Stapleton, 2006). The ICC(2) coefficient, a measure of both inter-rater reliability and inter-rater agreement, evaluates the internal consistency reliability of the group means in a sample. ICC(2) estimates the reliability of mean differences across organizations (between-group variance) (Bliese, 2016).

Regarding the dimensions of PST, our analyses indicated that *leading whole*, ICC(1) values were 0.26 and ICC(2) values were 0.57 ($F = 2.30$, $p < 0.001$), *evaluating significance* ICC(1) values were 0.26 and ICC(2) values were 0.57 ($F = 2.31$, $p < 0.001$), *adopting a multidimensional view* ICC(1) values were 0.30 and ICC(2) values were 0.62 ($F = 2.62$,

$p < 0.001$) and *openness to a variety of opinions* ICC(1) values were 0.27 and ICC(2) values were 0.58 ($F = 2.62, p < 0.001$). Overall, the group-level ICCs are sufficiently large to suggest that it is both appropriate and important to examine group-level effects among these variables.

Data analysis

In order to investigate the differences in PST attribute by principal–middle leaders' (dis)similarity, MANOVA analysis was used. However, in the present study, the individual or within-level components of PST represent differences in ratings of PST that are unique to individual middle leaders' raters. The group-level variance components represent the shared perceptions of PST within a work group (SMT) and the divergent perceptions of PST in different work groups (schools). Since the previous analysis indicated differences between schools and high homogeneity among middle leaders of the same school, to better capture the relational properties, and following the recommendations by Hofmann and Gavin (1998), we group-mean centered the individual-level variables of PST to assess the differences in PST attributes by principal–middle leaders' (dis)similarity dyads.

Group-mean centering is preferable when the hypothesis of primary interest involves predictors at the individual level (Enders and Tofghi, 2007). First, group-mean centering approach allows to separate the between-group and the within-group components from the total variation to investigate how groups (contexts) affect PST attributes, explicitly accounting for the group structure in the model. Second, this approach makes it possible to capture the relative position of the group member in the group (i.e. each person's data are centered on the group mean). Finally, to further examine the moderating role of duration of acquaintance in the relations between principal–middle leaders' relational demographic variables (dis)similarity and PST attribute, we performed hierarchical regression analyses, using the SPSS macro PROCESS suggested by Hayes (2013). The significant interaction was plotted following Aiken and West's (1991) recommendation for reducing biases by calculating high and low levels of a continuous variable as one SD above and below the variable mean.

Results

Table 1 presents the means, standard deviations and intercorrelations matrix for all key variables included in the analysis.

Hypothesis tests

Principal–middle leader relational demography (dis)similarity and PST attribute. As part of the exploration of Hypothesis 1, which predicted higher PST in similar than in dissimilar relationships, MANOVA analysis was performed to investigate the differences in PST attribute by principal–middle leader (dis)similarity in gender, education and tenure. The multivariate analysis of variance was significant for gender, Wilk's $\Lambda = 0.82, F(1, 305) = 1.99, p = 0.09, \eta^2 = 0.185$. The means of PST, $F = 6.36, p = 0.015$, Cohen's $d = 0.29$, of *evaluating significance* $F(1, 305) = 5.09, p = 0.029; d = 0.32$, *openness to a variety of opinions* $F(1, 305) = 3.09, p = 0.085; d = 0.18$, *leading wholes* $F(1, 305) = 7.73, p = 0.008; d = 0.22$ and *adopting a multidimensional view*, $F(1, 305) = 1.66, p = 0.20; d = 0.224$ as perceived by middle leaders were higher in the case of principal–middle leaders similarity than in the case of principal–middle leaders dissimilarity. Thus, consistent with part of Hypothesis 1, the differences in PST by gender similarity were found to be significant but small in effect size. However, no differences were found in middle leaders' PST attribute between similar dyads in comparison with dissimilar ones for education and tenure.

Following the MANOVA results, descriptive statistics and correlations for PST, gender and school size are presented in Table 2. The average PST levels suggest that middle leaders'

	Individual level <i>M</i> (SD)	School (group-focused) level <i>M</i> (SD)									
		1	2	3	4	5	6	7	8	9	10
1. PST total	3.587 (0.53)										
2. PST: evaluating significance	3.566 (0.70)	0.900**									
3. PST: openness to a variety of opinions	3.652 (0.65)	0.847**	0.672**								
4. PST: leading wholes	3.555 (0.74)	0.842**	0.708**	0.671**							
5. PST: adopting a multi-dimensional view	3.574 (0.59)	0.905**	0.767**	0.653**	0.658**						
6. Gender dissimilarity	0.420 (0.49)	0.162	0.158	0.164	0.110	0.140					
7. Education dissimilarity	0.410 (0.49)	0.060	-0.024	0.120	-0.040	0.115	0.547**				
8. Tenure dissimilarity	8.995 (6.45)	0.204	0.080	0.110	0.194	0.288*	0.044	0.033			
9. Duration of acquaintance	7.19 (4.97)	-0.229	-0.131	-0.320**	-0.194	-0.156	0.404**	0.324**	-0.258*		
10. School size	419.06 (177.13)	-0.119	0.001	-0.069	-0.072	-0.234*	-0.095	-0.125	-0.045	0.044	

Note(s): Correlations for the "school level" group appear below the diagonal (*n* = 101); for the "individual level" group, above the diagonal (*n* = 305). **p* < 0.05; ***p* < 0.01

Table 1.
Descriptive statistics and intercorrelation matrix for study variables

Principals' systems thinking attribute

attributions of PST and of the PST dimensions were higher in gender-similar relationships than in gender-dissimilar ones.

Hypothesis 2 concerned the moderating role of duration of acquaintance in the relationship between principal–middle leaders relational demography (dis)similarity in gender, education and tenure and PST attribute (and PST dimensions). Regression analyses using the PROCESS macro (Model 1) (Hayes, 2013) was conducted with duration of acquaintance as the moderator variable, principal–middle leaders relational demography (dis)similarity in gender, education and tenure as the independent variables, and PST (and PST dimensions) as the dependent variables.

Regarding principal–middle leaders relational demography (dis)similarity in gender, as the dependent variable model for PST shows, after controlling for school size, the interaction of duration of acquaintance and principal–middle leaders gender similarity on PST was significant ($\beta = -0.04, p < 0.05$) (see Table 3). These findings indicated that duration of acquaintance moderated the relationship between principal–middle leaders gender similarity and PST attribute and the PST dimensions of *leading wholes* and *adopting a multidimensional view*. When the acquaintance of principal–middle leaders was short, PST level was higher with gender similarity than with gender dissimilarity (solid line; $B = 0.294, t = 2.133, p = 0.035$). However, when the acquaintance of principal–middle

	β (SE)	BootLLCI	BootULCI	<i>t</i>	R^2	<i>F</i> -value
<i>Dependent variable: PST</i>						
Predictors					0.08	2.49*
Constant	0.47 (0.13)	0.20	0.73	3.50***		
School size	-0.01 (0.00)	-0.01	0.01	-1.92*		
Principal- middle leaders' gender similarity	0.07 (0.10)	-0.13	0.27	0.69		
Duration of acquaintance	-0.01 (0.01)	-0.02	0.01	-0.48		
Duration of acquaintance * Principal- middle leaders' gender similarity	-0.04 (0.02)	-0.07	-0.04	-2.00*	0.03	4.01*
<i>Dependent variable: PST-leading wholes</i>						
Predictors					0.10	3.21**
Constant	0.54 (16)	0.22	0.86	3.40***		
School size	-0.01 (0.00)	-0.01	0.01	-1.56		
Principal- middle leaders' gender similarity	0.08 (0.12)	-0.16	0.32	0.64*		
Duration of acquaintance	-0.02 (0.01)	-0.04	0.00	-1.42		
Duration of acquaintance * Principal- middle leaders' gender similarity	-0.05 (0.02)	-0.09	-0.00	-2.04*	0.03	4.18*
<i>Dependent variable: PST-adopting a multidimensional view</i>						
Predictors					0.08	2.64*
Constant	0.60(0.15)	0.29	0.91	3.89***		
School size	-0.01(00)	-0.01	-0.00	-2.58***		
Principal-middle leaders gender similarity	-0.06(0.12)	-0.29	0.17	-0.52		
Duration of acquaintance	0.01(0.01)	-0.01	0.03	0.64		
Duration of acquaintance * Principal- middle leaders' gender similarity	-0.05(0.02)	-0.09	-0.01	-2.38**	0.04	5.69*
Note(s): <i>N</i> = 127. PST = Principal system thinking. Bootstrap sample size = 5,000, LL = Low limit, CI = Confidence interval and UL = Upper limit; * <i>p</i> < 0.05, ** <i>p</i> < 0.01, *** <i>p</i> < 0.001						

Table 3. Moderating effect of duration of acquaintance on the relation between principal–middle leader gender similarity and PST attribute (and leading wholes and adopting a multidimensional view)

leaders was high no difference was found between opposite gender and same-gender pairs (dashed line; $B = -0.150$, $t = -0.911$, $p > 0.10$) (see Figure 1).

Similarly, as the dependent variable model for *PST-leading wholes* shows, after controlling for school size, the interaction of duration of acquaintance and principal–middle leaders gender similarity on PST was significant ($\beta = -0.05$, $p < 0.05$) (see Table 3). When the acquaintance of principal–middle leaders was short, the *PST-leading whole* level was higher with gender similarity than with gender dissimilarity (solid line; $B = 0.352$, $t = 2.129$, $p = 0.035$). However, when the acquaintance of principal–middle leaders was high no difference was found between opposite gender and same-gender pairs (dashed line; $B = -0.192$, $t = -0.971$, $p > 0.01$) (see Figure 2).

As for the dependent variable model for *PST-adopting a multidimensional view* shows, after controlling for school size, the interaction of duration of acquaintance and principal–middle leader gender similarity on *PST-adopting a multidimensional view* was significant ($\beta = -0.05$, $p < 0.05$) (see Table 3). When the acquaintance of principal–middle leader was short, the level of *PST-adopting a multidimensional view* was lower with gender dissimilarity than with gender similarity (solid line; $B = -0.367$, $t = -1.939$, $p < 0.05$). However, when the acquaintance of principal–middle leader was high, no difference was found between opposite gender and same-gender pairs (dashed line; $B = 0.242$, $t = 1.524$, $p > 0.10$) (see Figure 3). Finally, the interaction of duration of acquaintance and principal–middle leaders (dis)similarity in education and tenure was not significant.

Discussion

Current educational complexities across multiple contexts require principals to adopt a more holistic perspective toward school management. Can holistic leadership perspectives become

Figure 1.
Interaction effect between duration of acquaintance and principal–middle leader gender similarity on *PST*

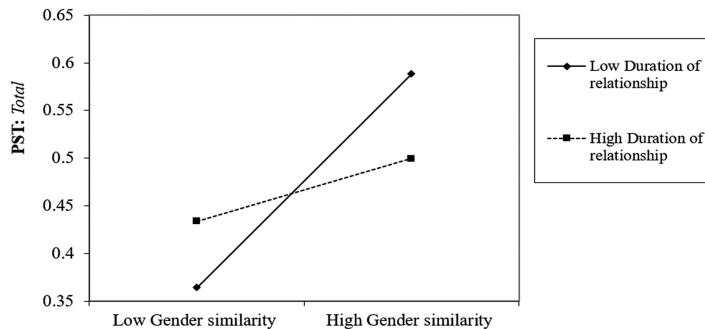
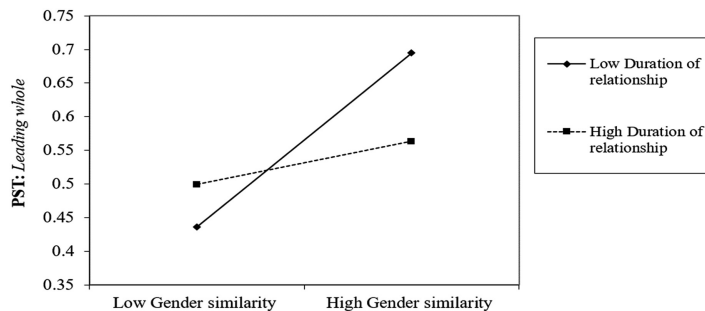


Figure 2.
Interaction effect between duration of acquaintance and principal–middle leader gender similarity on *PST-leading wholes*



systemized within school organizations? Schools encompass increasingly interrelated professional networks based on social and interpersonal interactions with implications for school management (Leithwood and Azah, 2016). Accordingly, the current study seeks to identify and examine the relationship between relational demographic variables and PST attribute, with specific consideration of multiple levels of analysis, namely, dyads and teams. Specifically, the present study was designed to investigate the influence of principal–middle leader relational demography variables (gender, education and tenure) (dis)similarity on PST attribute and how such relationships are contingent upon the duration of acquaintance.

Overall, our results accord with previous research calling for a follower-centric approach to leadership and the exploration of relational demography dissimilarity implications on dyads (Graham *et al.*, 2018; Uhl-Bien *et al.*, 2014). First, our findings may imply that it is both appropriate and important to examine group-level effects since there was a large degree of within-group homogeneity among middle leaders when investigating PST attribute. These results may imply that PST activities influence the SMT as a whole given the emphasis on common school objectives and the holistic perspective toward school issues, potentially affecting teamwork processes and outcomes. Recognizing that the higher level group may have influences on the PST attribute may be important for research within the school context, often characterized by nested data involving individuals (e.g. teachers and middle leaders) embedded in teams, who are embedded in school organizations. Klein *et al.* (1994) noted that in this context, the opportunity for researchers to make a fallacy of the wrong level is possible, that is, when researchers ascribe an effect to one level of analysis when that effect may actually be ascribable to another level. Future research may, therefore, investigate the relationship of PST to several SMT characteristics.

Second, our results do show the implication of relationship demographic variables of gender, and more importantly that the relationship of PST–middle–leader gender similarity is contingent upon the duration of relationship between the dyad. More specifically, PST (and PST dimensions) attributes were higher in gender-similar relationships than in gender-dissimilar ones. These results aligned with recent conceptualizations of leader–follower relationships in RLMX theories, focusing on how a member’s standing in his/her group, highlighting that differentiated dyadic relationships within a team influences followers’ attributes capturing individual-within-group differentiation (Sun *et al.*, 2020). However, for education and tenure no difference was found in PST as perceived by middle leaders between similar dyads in comparison to dissimilar ones. Researchers have distinguished between visible and invisible grouping attributes; age, gender and race are considered high visible attributes (“surface-level”) since they are easily observable (Phillips and Loyd, 2006). In contrast, tenure and education which are considered to have high in job relatedness because they directly influence task perceptions and professional proficiencies and are less easily

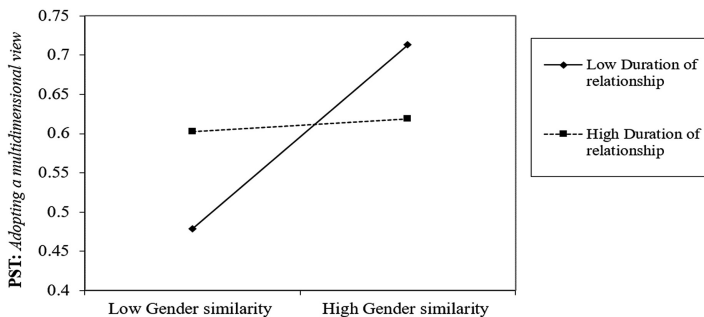


Figure 3. Interaction effect between duration of acquaintance and principal–middle leader gender similarity on PST-adopting a multidimensional view

observed because of low visibility (Phillips and Loyd, 2006). Since visible characteristics provide a basis on which individuals can identify with similar others and distinguish themselves, and individuals generally refer to characteristics that are readily apparent to formulate relationships (Berkovich, 2018), this might potentially explain our findings that only the influence of gender demography (dis)similarity on PST, a visible attribute, was significant. This accords with previous research emphasizing that stereotypical expectations shape the way male and female principals are perceived by others, showing the implicit impact of gender stereotypes (Ellemers, 2018). This result is particularly important within the educational context since schools are commonly female-dominated organizations and can hardly be considered as gender-diverse environments.

Furthermore, duration of acquaintance was found to moderate the relationship between principal–middle leader gender similarity and PST attribute. When the acquaintance of principal–middle leaders was short, the degree of PST (and PST-leading wholes and PST-adopting a multidimensional view) was higher with gender similarity than with gender dissimilarity. However, when the acquaintance was long, dyadic gender composition was not significant. Perhaps, over time, as principals and middle leaders get to know each other better, the nature of relationships changes to decrease the influences of demographic differences and perceived stereotypes on the PST attribute, especially when it comes to work on systemic issues related to the school (leading wholes and adopting a multidimensional view). These results accord with previous research showing that the positive effect of principal-teacher gender similarity on teacher's affective trust is contingent upon the duration of acquaintance (Berkovich, 2018). It seems that an important part of the socio-psychosocial influences weakens as the length of relationship among principal and middle leaders increases. However, for the sub-dimension of *evaluating significance* and *openness to a variety of opinions*, which involves identifying small events that have significant implications for the whole system as well as inviting middle leaders to participate in the decision-making process, no moderating effect of duration of acquaintance was found. Potentially this finding may be explained by the fact that these dimensions reflect aspects of ST that remain close to the characteristic of female leadership and therefore will be attributed to a female principal no matter how long the dyads have worked together.

Limitations and future studies

Several limitations of the study warrant further attention in future research. First, the data were largely self-reported and retrospective and therefore subject to bias. However, previous research suggests that self-reported data are not as limited as previously believed, and people often accurately appraise their social environment (Alper *et al.*, 1998). Therefore, it is a reasonable assumption that the activities reported by the participants were representative of the actual situation. Second, the sample involved elementary school faculty and principals, limiting the ability to generalize the findings to the secondary education system, in which the demographic variables of staff might be different. Similarly, the research was not conducted in an educational context representing all sectors in Israel, restricting the ability to generalize the results to other sectors. Since Israel is a multicultural society, other cultural contexts with a different perspective toward gender equality should be studied in future research. For example, the Arab sector is characterized by collectivism, high power distance and low gender equity whereas the Jewish sector is characterized by individualism and low power distance, reflected in the relationships between principals and teachers (A'li and Da'as, 2017). In addition, this study examined only the PST attribute outcome by examining relational demography influences on attributions middle leaders make about their principal's ST. Future research could extend the inquiry to whether these attributions would influence middle leaders' performance using a network approach well suited for investigating

leadership as a relational phenomenon. Finally, the future study could extend the inquiry to investigate the moderating influence of principal–middle leaders relational demography (dis)similarity on the relationship of PST to middle leader attitudes and behaviors, both at the individual and team level of analysis.

Conclusion and implications

The present study findings may have implications for educational leadership research and policy design. First, the present findings may advance theoretical knowledge regarding PST social dynamics among dyads within an SMT because they indicate that middle leaders' attribute of PST may be shaped by factors both at the individual level and above (dyadic and group). Therefore, these findings may suggest considering the impact of school leadership at several levels, leading researchers and practitioners alike to reexamine their perspectives to better understand the nature and influence of a principal's activities more broadly, both interpersonally and as a team leader. Second, it seems from our findings that principal–middle leader relationships may develop over time, attenuating the implicit but strong impact of gender stereotypes. By shaping what attracts our interest and what knowledge seems worthwhile, stereotypes generally establish how objective information about men and women is processed (Fiske and Taylor, 2013). Therefore, since the within gender similarity PST level attribute was higher and given that educational organizations are characterized as female dominated, one practical implication to be drawn would involve a possible preference for women in principal recruitment and selection. Worldwide, the percentage of females in the population of school principals is consistently much lower than the percentage of females in the population of teachers (Marczynski and Gates, 2013). Also, our findings suggest that principals of both genders should consciously foster good interpersonal relationships with middle leaders. Developing principals' capability to maintain healthy interpersonal relationships with middle leaders regardless of gender could enable them to appreciate principals' efforts to engage in ST activities. Therefore, programs to train and mentor new principals involving workshops or colloquia aimed at developing interpersonal communication skills should be developed.

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About the authors

Pascale Benoliel, Ph.D. Senior Lecturer, Faculty Member, Educational Leadership and Policy, School of Education, Bar-Ilan University, Israel. Her research areas include boundary management in school leadership, teamwork in school management team, cross-cultural analysis, education governance, comparative research, and quantitative research methods. Pascale Benoliel is the corresponding author and can be contacted at: pascale.benoliel@biu.ac.il

Haim Shaked, Ph.D., Prof. Haim Shaked is the President of Hemdat Hadarom College of Education, Netivot, Israel. As a scholar-practitioner with seventeen years of experience as school principal, his research interests include instructional leadership, system thinking in school leadership, and education reform. On these topics, he has published more than fifty refereed research articles, book chapters, edited books, and authored books.

Nehama Nadav, PhD candidate, Educational Leadership and Policy, School of Education, Bar-Ilan University, Israel.

Chen Schechter, Ph.D., Professor, leadership, organizational development and policy in education, School of Education, Bar-Ilan University, Israel. Chen is the Editor-in-Chief of the *Journal of Educational Administration*. Head, MOFET National Research and Program Development Institute for Teachers and Teacher Educators. He also serves as Chair of the Board of Directors at the Institute for the Advancement of Teaching, Learning and Social Integration. Chen's research interests include leadership development/preparation, educational change/reform in accountability systems, learning from success, collaborative learning strategies, and systems thinking leadership.

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