



State-of-the-science review of leader-follower dyads research

Jayoung Kim^{a,*}, Francis J. Yammarino^b, Shelley D. Dionne^b, Rory Eckardt^b, Minyoung Cheong^c, Chou-Yu Tsai^b, Jie Guo^b, Jin Won Park^b

^a Bass Center for Leadership Studies, Binghamton University, State University of New York, Binghamton, NY 13902-6000, United States of America

^b Bass Center for Leadership Studies and School of Management, Binghamton University, State University of New York, United States of America

^c School of Graduate Professional Studies at Great Valley, Pennsylvania State University, United States of America

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ABSTRACT

Despite its importance in multilevel research, the dyad level of analysis has been known as the most poorly understood level. Suggestions have been made recently in terms of levels alignment issues and methodologies to enhance the understanding of dyadic phenomena. Given recent remedies for dyads research and that the leader-follower dyad is generally considered the key dyad in organizations, we conducted a comprehensive review of the current state of leader-follower dyads research to assess what we know and how much we know about leader-follower dyads research conducted at the dyad level. Specifically, we summarized empirical studies that focused on leader-follower dyads that used data collected on the same variables from both dyadic partners. This review involved coding studies of these “pure” leader-follower dyads based on several dyadic theories (e.g., vertical dyad linkage, individualized leadership, leader-member exchange, leader-follower congruence) and multiple analytic methods (e.g., multilevel modeling, polynomial regression, WABA) that dealt with leader-follower dyads directly. Based on the results, this review generated a nomological network of constructs for understanding leader-follower dyads and to provide suggestions for future leader-follower dyads research.

Introduction

The leader-follower dyad, a unit composed of one leader and one follower who are interdependent, is generally identified as the key dyad among multiple types of dyads in organizations (e.g., Bass, 2008; Gooty & Yammarino, 2011; Yammarino & Gooty, 2017) and has been the focus of numerous leadership studies (see Dionne et al., 2014; Gooty, Serban, Thomas, Gavin, & Yammarino, 2012; Yammarino, Dionne, Chun, & Dansereau, 2005). However, of the four levels of analysis in a typical levels framework (individual, dyad, group/team, and collective/organization - Dansereau, Alutto, & Yammarino, 1984), the dyad level is known as the most poorly understood level (Gooty & Yammarino, 2011; Yammarino & Gooty, 2017) and has often been ignored in multilevel research (Tse & Ashkanasy, 2015; Yammarino et al., 2005).

The major reason contributing to the lack of understanding of the dyad level is levels of analysis misalignment issues. In particular, there is an emerging consensus among organizational behavior and leadership scholars that when *pure* dyadic phenomenon is focal, it may be misleading to theorize and hypothesize at the dyad level but measure or

assess the phenomenon from only one side of the dyadic partnership (an individual-level approach, e.g., individual's perceptions of the dyadic phenomenon) (Gooty et al., 2012; Gooty & Yammarino, 2011; Krasikova & LeBreton, 2012; Tse & Ashkanasy, 2015; Yammarino & Gooty, 2017). Pure dyadic phenomena reside conceptually and operate empirically at the dyad level (not the individual level) and can include notions such as dyad characteristics (e.g., dyadic tenure, demographic compositions), emergent properties (e.g., interaction, relationship, exchange) shared within the dyad, quality of those emergent properties as assessed by both members, and (dis)agreement between the dyadic partners. Since dyad-level phenomena are mostly emergent from the interaction between the two individuals (dyadic members or partners) (Gooty & Yammarino, 2011), measuring a variable of interest from solely one dyadic partner would lead to an incomplete view of the phenomenon of interest and may result in a misrepresentation of the dyadic relationship (Krasikova & LeBreton, 2012).

In other words, when understanding the (shared) reality of the dyadic relationship is of interest, rather than one person's perception of the relationship, taking a dual perspective (Paglis & Green, 2002) will

* Corresponding author.

E-mail addresses: jkim416@binghamton.edu (J. Kim), fjyammo@binghamton.edu (F.J. Yammarino), sdionne@binghamton.edu (S.D. Dionne), reckardt@binghamton.edu (R. Eckardt), mxc1016@psu.edu (M. Cheong), ctsai@binghamton.edu (C.-Y. Tsai), jguo40@binghamton.edu (J. Guo), jpark285@binghamton.edu (J.W. Park).

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provide a more valid understanding of the focal dyadic phenomenon. Measuring a variable of interest only from one dyadic member's perspective assumes that this focal person's view represents two possibly different views and ignores the other member's viewpoint. Omitting one member's perspective is potentially problematic as one person's perception may not be enough to represent two parties' perceptions of the shared dyadic experience, and two people's views toward an identical object can be either similar or different (Atwater & Yammarino, 1997; Matta, Scott, Koopman, & Conlon, 2015). The general idea of considering all participating parties in the phenomenon of interest is therefore critical from a validity standpoint. It is interesting to note that this approach is regularly used in group- and team-level studies, where data are frequently collected from *all* group and team members. In a similar approach, when interested in pure dyadic phenomenon, researchers could take both dyadic partners' view into account and collect data from all (both) dyad members (Dansereau et al., 1984; Krasikova & LeBreton, 2012; Tse & Ashkanasy, 2015; Yammarino & Gooty, 2017).

As these levels-of-analysis misalignment issues for the dyad level are becoming more understood and interest in applying potential remedies have increased (Krasikova & LeBreton, 2012; Tse & Ashkanasy, 2015; Yammarino & Gooty, 2017), we believe it is timely to review the current state-of-the-science of leader-follower dyads research. Our focus in this review is to take stock of *what we know* and *how much we know* about pure leader-follower dyadic phenomena. In doing so, we generate a nomological network for leader-follower dyads research to represent current empirical findings and highlight research areas that require further attention. We limit this review to "pure" leader-follower dyadic studies (see Gooty & Yammarino, 2011) that align the levels of theory, measurement, analysis, and inference at the dyad level. Such studies theorize a dyad-level phenomenon (e.g., dyad characteristics, emergent properties, (dis)agreement in dyads), assess at least one variable about the leader, follower, or relationship from both dyadic partners' perspectives, and generate dyad-level variables by matching both dyadic partners' responses. As our focus is on the pure dyad level, we will not be reviewing studies that mainly examined the correlates, causes, or effects of individual-level perceptions of the relationship (e.g., follower's leader-member exchange (LMX) perception) (see Dulebohn, Bommer, Liden, Brouer, & Ferris, 2012).

Our work differs from previous reviews that incorporated leader-follower dyadic theories (e.g., Dionne et al., 2014; Gooty et al., 2012; Krasikova & LeBreton, 2012; Liden, Anand, & Vidyarthi, 2016; Sin, Nahrgang, & Morgeson, 2009; Tse, Troth, Ashkanasy, & Collins, 2018; Yammarino et al., 2005) in that we have a specific focus on a single level of analysis (i.e., dyad level only) and yet a broader focus in terms of theories, as we are not limiting our review to LMX, one of the most studied theories on leader-follower relationship. Contrary to Yammarino et al. (2005)'s comprehensive review on leadership and levels of analysis that incorporated various leadership theories and pinpointed levels of analysis misalignment issues, we particularly focus on studies of dyad-level theories and summarize the current state of leader-follower dyads research. Moreover, beyond Dionne et al. (2014)'s more up-to-date review that examined levels of analysis incorporation in both conceptual and empirical leadership research published only in *The Leadership Quarterly*, this review focuses explicitly on dyad-level leadership studies published in several top organizational behavior and management journals and aims to summarize leader-follower dyads research in terms of theories, methods, variables, and variable dimensions.

In addition, our review differs from the extant reviews on leader-follower dyads that focus on levels-based issues only within LMX research (Gooty et al., 2012), only with regard to methodological issues in dyads research (Krasikova & LeBreton, 2012), only on LMX agreement (Sin et al., 2009), or only on the state of affect and LMX research from a multilevel perspective (Tse et al., 2018). Rather, our focus is to review pure dyad-level studies in terms of the usage of theories, methods, and variables in a broader scope. In terms of theories and variables, our

scope includes but is not limited to dyad-level LMX (Tse et al., 2018) and/or LMX agreement (Sin et al., 2009). With respect to pure dyadic level investigations, we also consider vertical dyad linkage (VDL, e.g., Dansereau, Graen, & Haga, 1975), individualized leadership (e.g., Dansereau et al., 1995), LMX, relational leadership theory (RLT, e.g., Uhl-Bien, 2006), and leader-follower congruence (e.g., Kristof-Brown, Zimmerman, & Johnson, 2005). With regard to methods, we are not focusing on raising methodological concerns but rather concentrating on understanding how each dyadic research method proposed and reviewed elsewhere (e.g., Gooty & Yammarino, 2011; Krasikova & LeBreton, 2012) - such as multilevel modeling, polynomial regression, Within and Between Analysis (WABA), and Actor-Partner Interdependence Model (APIM)/One-With-Many Model (OWM) - has been utilized in leader-follower dyads studies. Finally, this review is distinct from Liden et al. (2016)'s theoretical/conceptual review, which centers on the development and nature of dyadic relationships, as we review empirical leader-follower dyads studies and concentrate on the variables used in those studies to generate a nomological network for leader-follower dyads research.

In summary, we extend the findings from the aforementioned reviews, first, by capturing studies on leader-follower dyads published in multiple journal outlets; second, by including dyadic relationship-based studies not limited to only LMX theory; third, by reviewing studies that include variables of focus assessed from both dyadic partners; and fourth, by developing a nomological network relevant for leader-follower dyads theory building and testing.

In the following sections, to help frame our review, we provide an overview of current theories on leader-follower dyads, suggested research methods for examining dyadic phenomena, and levels and dimensionality issues regarding leader-follower dyads. To explore how specific theories and methods have been utilized to examine dyadic phenomenon, we develop targeted research questions to be addressed via comprehensive review results derived from coding pure leader-follower dyads studies. Ultimately, we generate a nomological network derived from key variables within existing dyad studies and present the connection among these variables to summarize the current state of leader-follower dyads research. Based on review results and the proposed nomological network, we suggest future directions for leader-follower dyads research.

Overview and research questions

Theories of leader-follower dyads

We initially employed five theories (i.e., VDL, Individualized Leadership, LMX, Relational Leadership, Leader-Follower Congruence) on leader-follower dyads or leader-follower relationships identified in a previous review by Dionne et al. (2014) as the framework to categorize leader-follower dyads studies in our review. These five theories represent leadership generally proposed as pure leader-follower dyadic relations of interest.

Vertical dyad linkage (VDL)

VDL challenged the assumptions of the traditional leadership approach (i.e., Average Leadership Style, ALS) and explained the mechanism of differentiated relationship development by introducing the concept of 'negotiating latitude' (Dansereau et al., 1975; Dansereau, Cashman, & Graen, 1973; Graen, 1976). Specifically, depending on the degree of the negotiating latitude within dyads, the dyadic relationship between supervisor and subordinate can be either supervision (low negotiating latitude) or leadership (high negotiating latitude) (Dansereau et al., 1975). As VDL addressed a separation of in-groups and out-groups within an existing group, the level of analysis for VDL was suggested as dyads within group (see Dansereau, Yammarino, & Markham, 1995).

Empirical support for VDL showed mixed results. VDL was

supported with superior-manager dyads in a public university setting (Dansereau et al., 1975; Liden & Graen, 1980), but with different samples (Rosse & Kraut, 1983) and different measures of negotiating latitude and analytical methods (Nachman, Dansereau, & Naughton, 1983), the results were inconsistent with the early studies. The conflicting results raised questions about the validity of the negotiating latitude measure and the level of analysis of VDL.

Despite these questions, VDL made a significant contribution to the field by challenging the assumption of ALS regarding leader-follower relationships and suggesting such relationships are often differentiated in a group context. This was a new perspective on leader-follower relationships that placed the 'dyad' as a central unit of analysis for leadership research. As a result, VDL became the foundation of other leader-follower dyadic relationships theories.

Individualized Leadership

Knowing that leaders form differentiated relationships with followers, Dansereau et al. (1984) provided empirical support for the level of the leader-follower relationship such that perceptions of investments and returns in the relationship were similar between the leader and follower and this pattern was replicated across all dyads with only the degree of investments and returns varying. The notion that a leader and a follower share similar perceptions but the degree of perceptions differ from dyad to dyad was further developed as individualized leadership theory (Dansereau, 1995; Dansereau et al., 1995; Yammarino & Dansereau, 2002). Individualized leadership focuses on the reciprocity (i.e., investments and returns) process that makes two individuals (i.e., leader and follower) become (or emerge as) a dyad. Specifically, the iterative process of exchanging support for self-worth and satisfying performance between leader and follower helps the relationship between the dyadic partners to become unique and independent from other dyads and the group, and fosters the interdependence within the dyad (Yammarino & Dansereau, 2002).

Individualized leadership has received empirical support from both quantitative and qualitative studies such that support for self-worth and satisfying performance (measured from both leader and follower perspectives in quantitative studies) showed similarity within the dyads and differences across the dyads (Dansereau et al., 1995; Wallis, Yammarino, & Feyerherm, 2011). In other words, dyads were characterized as independent from other dyads and the group yet having interdependence between dyadic partners in those studies.

Individualized leadership was not suggested as an alternative to ALS or VDL, but rather as an additional perspective on leadership by identifying a relatively new relational process (i.e., investment-return cycle), and suggesting two variables (i.e., support for self-worth, satisfying performance) and their association that operate at the dyad level (Dansereau et al., 1995). Although individualized leadership received empirical support, some questions on contextual factors (e.g., antecedents and outcomes of support for self-worth, boundary conditions) have been raised, resulting in calls for additional research to resolve issues and provide greater clarity to dyadic leadership concepts (Ferris & Harrell-Cook, 1998; Mumford, 1998).

Leader-member exchange (LMX)

LMX (Graen & Cashman, 1975; Graen & Uhl-Bien, 1995) kept the central notion of VDL – that leaders develop differentiated relationships that form in-groups/out-groups – but put more emphasis on the quality of the exchange relationship that a leader maintains with followers. A low-quality relationship was characterized as being transactional, which is close to economic exchange, whereas a high-quality relationship was characterized as having high trust, mutual liking, and respect, which represents social exchange (Bernerth, Armenakis, Feild, Giles, & Walker, 2007). After exploring the existence of differentiated relationships depending on the relationship qualities, LMX has evolved to reflect a cycle of leader-follower relationship development (Graen & Uhl-Bien, 1995).

After further development of LMX theory (for a review, see Dulebohn et al., 2012), Bernerth et al. (2007) introduced an additional perspective and measure (i.e., Leader-Member Social Exchange, LMSX) that concentrated on the 'social exchange' nature of the leader-follower exchange relationships. In other words, this additional view shifted the focus of LMX from the quality of the relationship (e.g., affect, respect) to the quality of the (social) exchange behavior in the relationship. Colquitt, Baer, Long, and Halvorsen-Ganepola (2014) provided initial evidence that LMSX captures the social exchange nature of the leader-follower relationship better than other relationship related measures, including LMX-7, by examining the face validity of the measures from undergraduate (mostly not employed) students' viewpoint (with same-source data) and suggested that LMSX might be more appropriate to use when studying LMX and the social exchange in relationships.

While LMSX has refocused exploration on the quality of the social exchange and related behaviors, some issues remain surrounding the concept of LMX such that the level of LMX theory is unclear. Although LMX was introduced conceptually as a dyad-level theory, the majority of LMX studies have been conducted at the individual level (see Dionne et al., 2014; Gooty et al., 2012; Yammarino et al., 2005). Followers' perception of LMX quality was mostly measured at the individual level and has been shown to be both an important predictor of an individual's cognitive, affective, and behavioral outcomes and a mediating mechanism that connects individual or interpersonal relationship characteristics and those individual outcomes (Dulebohn et al., 2012; Gerstner & Day, 1997; Ilies, Nahrgang, & Morgeson, 2007; Rockstuhl, Dulebohn, Ang, & Shore, 2012). Measuring LMX at the individual level can be helpful when examining the cause and effect (antecedents and outcomes) of an individual's relationship perceptions but may be problematic when used to represent the dyadic relationship, as one individual's relationship perception may not be an accurate representation of the relationship (Gooty & Yammarino, 2016; Krasikova & LeBreton, 2012). When an individual's LMX quality perception is used as a proxy for dyadic LMX quality, and inferences are made for a dyadic phenomenon, theoretical contribution for understanding leader-follower dyads may be limited.

Several researchers investigated the level at which LMX operates and showed that, when properly measured and analyzed with both dyadic partners' perspectives, LMX can be a dyadic phenomenon (Gooty & Yammarino, 2011; Markham, Yammarino, Murry, & Palanski, 2010; Schriesheim, Castro, Zhou, & Yammarino, 2001). Although the number of pure dyad-level LMX studies (i.e., with leader and follower both reporting about LMX and, for example, an outcome) is far less than individual-level LMX studies (e.g., follower reports about LMX perception and the leader reports about performance), dyad-level LMX studies are increasing recently with better measurement and analysis practices.

Relational leadership

Relational leadership theory (RLT) (Uhl-Bien, 2006; Uhl-Bien & Ospina, 2012) highlights the importance of the relational *process* that enables leadership and considers leadership as a socially constructed phenomenon (Yammarino, Salas, Serban, Shirreffs, & Shuffler, 2012). Moreover, the relationship is considered as an outcome that is produced through the relational process (e.g., social interactions) (Uhl-Bien, 2006). In other words, RLT is a theory that emphasizes relational dynamics as an organizing mechanism and views the relationship as an outcome.

As the major focus of RLT is on understanding the *process* of relationship development, qualitative research methods (e.g., organizational discourse analysis) have been suggested as a suitable investigative approach (Fairhurst & Uhl-Bien, 2012; Uhl-Bien, 2006; Uhl-Bien & Ospina, 2012). RLT has been further advanced through applying diverse disciplinary perspectives and contexts (see Uhl-Bien & Ospina, 2012) and mixed methods (e.g., Meinecke, Lehmann-Willenbrock, & Kauffeld, 2017) to capture, for example, the relational dynamics in

leader-follower dyadic communication patterns.

The focal relationship in RLT, however, is not limited to leader-follower relationship but includes all possible forms of relationships within organizations (Uhl-Bien, 2006). In terms of levels, RLT involves dyads, but goes beyond and includes groups and collectives. Although RLT does not directly or solely focus on dyadic phenomenon, the theory's relational process orientation can be used as a framework to understand dyadic relationship development and procedural antecedents of relational outcomes. In particular, RLT provides insight to investigate issues such as the factors affecting relationship development, the associations among factors to build an emerging dyadic relationship, and patterns of social interactions in the relationships.

Leader-follower congruence

Congruence involves matching two conceptually distinct constructs and can be presented with different terms such as fit, similarity, match, or agreement (Edwards, 1994). Leader-follower congruence is one type of person-environment fit, considering the leader as the environment for the follower and vice versa (Kristof-Brown et al., 2005). Depending on the measure, congruence can be categorized into subjective (i.e., perceived) and objective (i.e., actual) congruence (Caplan, 1987; Kristof, 1996). While subjective congruence considers an individual's (e.g., follower's) belief about whether he/she fits well with the environment (e.g., leader), objective congruence involves explicit comparison of the follower's and the leader's characteristics or perceptions, measured from both independently (e.g., Coglisier, Schriesheim, Scandura, & Gardner, 2009; Sin et al., 2009). Needs-supplies fit and demands-abilities fit (Caplan, 1987; Kristof, 1996) have also been considered at the dyad level to predict followers' individual outcomes (e.g., Marstand, Martin, & Epitropaki, 2017).

Leader-follower congruence has gained empirical support in predicting various individual outcomes. Kristof-Brown et al. (2005)'s meta-analysis showed that leader-follower fit (e.g., value, goal, personality), including both subjective and objective fit, is positively related to individual outcomes such as job satisfaction, supervisor satisfaction, and LMX. Additionally, relational demography (Tsui & O'Reilly, 1989), which considers the similarity and dissimilarity of demographic characteristics (e.g., race, gender, education level, job tenure), was presented as a dyad-level variable that predicts individual outcomes. The association between (dis)similarity in individual characteristics in dyads and individual outcomes provides an understanding of how individuals are influenced by having a better/worse matched partner. This research framework can be extended by employing dyad-level outcomes and provide an additional understanding of leader-follower dyadic relationships.

Summary

Leader-follower dyadic phenomena have been viewed from diverse theoretical perspectives that fall into the general domain of leadership or leader-follower relationships. Each theory views the dyadic phenomena from different levels-of-analysis perspectives and captures the dyadic phenomena differently by focusing on either process or outcomes. Individualized leadership emphasizes the investment-return cycle as a key process to build interdependence in the dyad, whereas RLT focuses on the dynamic nature of the relationship development process. On the other hand, LMX concentrates on high quality relationship outcomes, and leader-follower congruence considers the outcomes of (mis)match between two individuals' characteristics. Given the different foci, each theory provides a foundation for different research questions on leader-follower dyadic phenomena. Moreover, it is possible that theories other than these five theories could have been used to examine different aspects of leader-follower dyads.

To understand how much the dyad- and/or relationship-related theories in leadership have been employed and what other theories have been used in leader-follower dyads studies since the beginning of dyads studies to provide a comprehensive overview of the state of

leader-follower dyads research and identify theories that have been (under)utilized in leader-follower dyads studies, we propose the following research question on the usage of each theory in leader-follower dyads research.

Research Question 1(RQ1). *What is the current usage of dyad theories to explain the leader-follower dyadic phenomenon? Which theories are used, to what degree, and how are they formulated to account for pure dyadic phenomenon?*

Dyadic research methods

Analyzing dyadic data with appropriate dyadic research methods and techniques requires specification of the type of dyads involved (Gooty & Yammarino, 2011; Krasikova & LeBreton, 2012; Tse et al., 2018). For example, failure to include group membership as a group-level variable when dyads are embedded in groups could result in inaccurate examination of dyadic phenomena. Specifically, dyadic data can be collected from either independent dyads (i.e., one leader and one follower) or dependent dyads (i.e., one leader and multiple followers in a group) (see Gooty & Yammarino, 2011). As the importance of considering data dependencies in dyadic analyses has been emphasized in previous research (Gooty & Yammarino, 2011; Krasikova & LeBreton, 2012; Tse et al., 2018), we examine whether the type of dyads has been considered in the leader-follower dyads research by addressing research question below:

Research Question 2a (RQ2a). *Do leader-follower dyad studies focus on independent or dependent dyads and how is the focus typically justified?*

Several specific methods have been suggested for testing theoretical notions about leader-follower dyads and analyzing data collected from both dyadic partners (see Gooty & Yammarino, 2011; Krasikova & LeBreton, 2012; Liden et al., 2016; Yammarino & Gooty, 2017). The usage of these available methods depends on the research questions, and certain questions may require the use of more than one of these primary methods summarized below.

Multilevel modeling

When a research question involves contemporary cross-level effects (see Yammarino & Gooty, 2019) – such as a direct relationship between a higher-level independent variable and a lower-level dependent variable, or a moderating effect of a higher-level independent variable on a lower-level independent-dependent variable relationship – multilevel (random coefficient) modeling can be implemented through several software platforms (e.g., Hierarchical Linear Modeling (HLM), R, Stata, and MPlus). When implementing a dyad-level variable as an independent variable, both dyadic partners' individual responses need to be included and aggregated (see Gooty & Yammarino, 2011).

Multilevel modeling can specify the types of dyads that enable researchers to study both independent and dependent dyads in organizations. In addition, multilevel modeling can address research questions involving (contemporary) cross-level interactions by including higher-level moderators in the model. Another strength of multilevel modeling comes from having an individual-level dependent variable; this allows for the examination of research questions pertaining to the effect of dyad-level predictors on individual outcomes. When the phenomenon of interest is a (contemporary) cross-level relationship, then multilevel modeling is a suitable method to use. However, when the phenomenon of interest involves a higher-level (e.g., dyad-level) dependent variable, multilevel modeling might not be applicable.

Polynomial regression

Polynomial regression and response surface methodology (Edwards & Parry, 1993; Shanock, Baran, Gentry, Pattison, & Heggstad, 2010) have been introduced as alternatives to difference scores when examining the effect of similarity, congruence, fit, and/or the match between two entities or notions. As a dyad involves two individuals, polynomial regression could be a suitable method for studying the

Table 1
Summary of dyadic research methods.

Method	Objective/research question	Dependent/independent dyad	Level: independent variable	Level: dependent variable
Multilevel modeling	Cross-level effects (contemporary)	Both	Dyad	Individual
Polynomial regression	Effect of leader-follower congruence	Both	Dyad	Individual
WABA	Level of variable (WABA I), level of relationship (multi-level effects) (WABA II), cross-level effects (traditional)	Both	Dyad	Dyad
APIM/OWM	Mutual influence	APIM: Independent OWM: Dependent	Dyad	Individual

effects of convergence and divergence of two individuals' perceptions (Liden et al., 2016) or the effects of similarity and dissimilarity of two individuals' characteristics on individual outcomes (e.g., Zhang, Wang, & Shi, 2012). After fitting the polynomial regression model, regression coefficients, covariances, and standard errors are used to estimate the response surface which visually shows the effects of convergence and divergence (Shanock et al., 2010). By examining the slope and curvature of the congruence and incongruence lines of the estimated response surface, research questions on the similarity, congruence, fit, or match can be investigated. In addition, nonindependence of dyads can be considered by employing cross-level polynomial regression (Jansen & Kristof-Brown, 2005).

Although polynomial regression is a useful tool to study the effect of congruence and/or divergence of the predictor on individual outcomes, this method cannot be directly implemented when examining dyad-level outcomes. The additional step of aggregating the two individuals' outcomes to generate a dyad-level variable is necessary to study dyadic phenomenon.

Within and Between Analysis (WABA)

WABA is useful for testing the level of analysis of variables (WABA I), the relationship between the variables (WABA II), and traditional cross-level effects (Dansereau et al., 1984; Gooty & Yammarino, 2011; Schriesheim et al., 2001; Yammarino & Dubinsky, 1992; Yammarino & Gooty, 2019). Contrary to other dyadic data analysis methods that allow dependent variables to only be at the individual level, WABA can be used when the dependent variable is a dyad-level variable. WABA uses ANOVA and correlation-based procedures to make inferences about the level(s) of variables and relationships between the variables and whether there are traditional cross-level effects (Dansereau et al., 1984; Yammarino, 1998; Yammarino & Gooty, 2017, 2019).

WABA is a tool to test the theoretically driven level of variables and relationships of interest. The strength of WABA is that it can consider different types of dyads (i.e., independent, dependent), test multi-level effects (e.g., dyad-level predictor – dyad-level outcomes), and employ dyad-level outcomes in the model. WABA can be challenging when the phenomenon of interest is complex, involving multiple mediators and moderators simultaneously in analyses (see Gooty & Yammarino, 2011; Yammarino & Gooty, 2017), but advanced WABA procedures can be employed to overcome this limitation (see Dansereau et al., 1984; Schriesheim, 1995; Yammarino, 1998).

Actor-Partner Interdependence Model (APIM)/One with Many (OWM) model

APIM and OWM models were initially suggested for dyadic analyses of interpersonal and romantic relationships (Kenny, Kashy, & Cook, 2006). The use of each model depends on whether the dyads are independent (i.e., APIM) or dependent (i.e., OWM) (Kenny et al., 2006; Krasikova & LeBreton, 2012). APIM requires both independent and dependent variables to be collected from both dyadic partners and could address research questions on how each dyadic partners' characteristics influence himself/herself and the dyadic partner (i.e., mutual influence) and can examine the relative strength of each effect (Krasikova & LeBreton, 2012). OWM can be employed for dependent

dyads that involve multiple relationships of an individual. OWM encompasses the actor effect, partner effect, and relationship effect and allows researchers to examine whether the reciprocity between the actor and partner are generalized among or unique to dyads (Krasikova & LeBreton, 2012).

APIM/OWM, depending on the type of dyads being studied, can simultaneously investigate interpersonal and intrapersonal effects. The independent and dependent variables should both be matched data (i.e., obtained from both actor and partner) from the dyad. When running the model, the independent variable and dependent variable are not aggregated to one value that represents the dyads, but each individual's response is used separately. APIM/OWM can examine how a dyad member can impact his/her relationship partner, but unique characteristics of the dyad or the effect of the combination of two individuals' characteristics cannot be examined through this method.

Summary

Various methods that have different foci and involve different levels of variables have been suggested for dyadic data analysis (see Table 1). Based on the research questions or hypotheses, methods could be used alone, jointly, or sequentially (see Yammarino & Gooty, 2019).

To understand how these four dyadic data analysis methods have been employed and explore what other methods have been used to study leader-follower dyads, our review results will be summarized by focusing on the below research question:

Research Question 2b (RQ2b). *What dyadic research methods have been used, and to what degree, in leader-follower dyad studies? How are they formulated and used to account for pure dyads?*

Antecedents and outcomes of leader-follower dyads

Studies on leader-follower relationships have been scattered in terms of theoretical basis and levels of analysis (e.g., individual level and dyad level). For instance, currently what is known about leader-follower exchange relationships is mainly based on individual-level studies (e.g., individual LMX perceptions) such that several meta-analyses were conducted to show the antecedents, consequences, and correlates of individual-level LMX perceptions (Dulebohn et al., 2012; Dulebohn, Wu, & Liao, 2017; Gerstner & Day, 1997), but dyad-level LMX has received relatively little attention in the reviews which led to limited understanding of dyadic exchange relationships. In terms of dyad-level studies, leader-follower congruence studies were conducted at the dyad level and predicted the impact of dyad characteristics (e.g., relational demography, personality similarity) on diverse individual outcomes (e.g., Tsui & O'Reilly, 1989; Zhang et al., 2012). Individualized leadership studies were also conducted at the dyad level by examining the relationship between support for self-worth and satisfying performance, both measured at the dyad level (Dansereau et al., 1995).

Given the possibility of examining diverse levels of analysis in leader-follower dyads studies, it would be beneficial to review and summarize the *pure* leader-follower dyads studies. Accordingly, we review studies that aligned the levels of theory, measurement, and analysis at the dyad level (i.e., interested in dyadic phenomenon, collected

matched data from both dyadic partners on at least one variable, and analyzed with dyadic research methods) to understand the antecedents and consequences of *pure* leader-follower dyadic phenomena.

To capture the current state of leader-follower dyads research, there is value in generating a nomological network (Cronbach & Meehl, 1955) that integrates previous research findings. In particular, a nomological network will show the unique characteristics of leader-follower dyads, and antecedents and consequences of those leader-follower dyads characteristics. As a result, the nomological network generated in this review will depict what we currently know about leader-follower dyads. Therefore, we propose the research question below:

Research Question 3 (RQ3). *What does the nomological network of leader-follower dyads look like? What are the key antecedents and consequences for leader-follower dyads, and are these dyadic level-focused or individual differences-focused precursors and consequences?*

In addition, the multidimensionality of leader-follower dyadic phenomenon could be considered as different dimensions capturing different aspects/characteristics of the dyad. Cognition, affect, and behavior dimensions have been widely used when studying groups/teams (e.g., Kozlowski & Ilgen, 2006), and these dimensions are applicable to dyads as a dyad is a unique/special form of a group. Dyads can have shared perceptions, affective states, and behavioral patterns, meaning that outcomes of dyadic interaction can be categorized into these dimensions.

For example, the LMX construct has been known to be multidimensional as different measures capture different aspects of the dyadic exchange relationship (Liden, Wu, Cao, & Wayne, 2016; Schriesheim, Castro, & Cogliser, 1999). LMX-7 (Graen & Uhl-Bien, 1995) appears to capture the cognitive aspect of a relationship by asking how the working relationship is perceived. LMX-MDM (Liden & Maslyn, 1998) measures affect, loyalty, contribution, and professional respect that appear to be a mix of affective, cognitive, and behavioral aspects of the relationship. Moreover, LMSX (Bernerth et al., 2007) focuses on the (social) exchanging behavior that takes place within the dyad. As such, for LMX and other dyadic phenomena, different measures capturing different aspects of leader-follower relationships raises the possibility of the multidimensional nature of dyadic phenomena. In addition, given that outcomes of leader-follower relationships can be categorized as affect, behavior, or cognition (Dulebohn et al., 2012; Gerstner & Day, 1997; Ilies et al., 2007; Rockstuhl et al., 2012), it would be worth examining the dimensions of the outcomes of dyads or dyadic relationships as well. Therefore, we propose:

Research Question 4 (RQ4). *What is the dimensionality (i.e., affective, behavioral, and cognitive) of variables in leader-follower dyads studies?*

Literature review method

To explore the above research questions and conduct a comprehensive review of leader-follower dyads research, studies focusing on the leader-follower dyads were identified through abstract keyword searches from web-based databases (Business Source Ultimate, PsychINFO, PsychARTICLES). The search, as in prior studies, was constrained to high-quality peer-reviewed journals in management, applied psychology, and leadership published until August 2017. From the Clarivate Analytics Web of Science 2016 impact factor list (category: Management; Psychology, Applied), we filtered journals with impact factor > 2.0 and sorted journals that publish empirical work on micro organizational behavior phenomena. Journal search based on the impact factor yielded 24 journals. In addition to these 24 journals, we included two journals (i.e., *Group & Organization Management*; *Journal of Leadership & Organization Studies*) in our review that have been included in previous reviews on leadership (Fischer, Dietz, & Antonakis, 2017; Gooty et al., 2012). A full list of journals and the number of articles included in the current review by journal is presented in Table 2.

Table 2

Article counts by journals.

Journal	Count
Academy of Management Journal	13
Administrative Science Quarterly	1
European Journal of Work and Organizational Psychology	1
Group & Organization Management	8
Human Relations	4
Journal of Applied Psychology	6
Journal of Business and Psychology	1
Journal of Leadership & Organizational Studies	4
Journal of Management	2
Journal of Management Studies	1
Journal of Occupational and Organizational Psychology	9
Journal of Organizational Behavior	6
Journal of Vocational Behavior	2
Organization Science	2
Organizational Behavior and Human Decision Processes	1
Personnel Psychology	2
The Leadership Quarterly	16
Total	79

Keywords used in the search were based on leader-follower dyad theories (i.e., ‘vertical dyad linkage’, ‘individualized leadership’, ‘leader-member exchange’/‘LMX’, ‘relational leadership’). For LMX, the keyword ‘dyad*’ was combined to specify the level because LMX has been theoretically suggested (Graen & Uhl-Bien, 1995) and empirically tested at multiple levels and not limited to the dyad level (Gooty et al., 2012). We conducted a search with broader keyword phrases ‘leader* & dyad*’, ‘superior* & dyad*’, ‘supervisor* & dyad*’, and ‘manager* & dyad*’ to search articles that focused on leader-follower congruence, as different terms are used to represent congruence (e.g., fit, similarity, congruence, agreement), and to capture articles that are based on theories other than five initial theories discussed above.

As empirical studies on leader-follower dyads are the focus of this review, only *quantitative studies on leader-follower dyads in workplace* were included. Specifically, for quantitative studies on leader-follower dyads, only studies that measured at least one variable from both members of the dyad were included. Conceptual work, qualitative studies, meta-analyses, literature reviews, lab experiments, student samples studies, and scale development studies were excluded, as they did not fit our inclusion criteria to explore our research questions.

Initial keyword searches from the journals yielded 435 articles. Inclusion criteria were applied to screen the initial searched articles. Abstracts and method sections of all articles were examined to determine the final set of articles to be coded (see Fig. 1 for article screening process). After the screening, 356 out of 435 articles were excluded. These 356 articles did not meet the inclusion criteria because they were either (a) conceptual (24 articles), (b) meta-analysis/literature review (12 articles), (c) scale development/construct validation (four articles), (d) qualitative studies (six articles), (e) empirical studies not specifically focused on leader-follower dyads (71 articles), (f) lab experiments/simulation (13 articles), (g) student sample studies (seven articles), (h) individual-level studies on leader-follower dyads (i.e., all variables were collected at the individual level) (194 articles), or (i) empirical studies that focused on leader-follower dyads and collected dyadic data but did not match dyadic data and used the data for separate individual-level analyses only (25 articles). Thus, 79 articles remained to be coded.

Coding process

Coder training

Four coders with doctoral-level training in organizational behavior and leadership conducted the coding. All coders had knowledge about dyads and levels of analysis issues and had experience coding articles

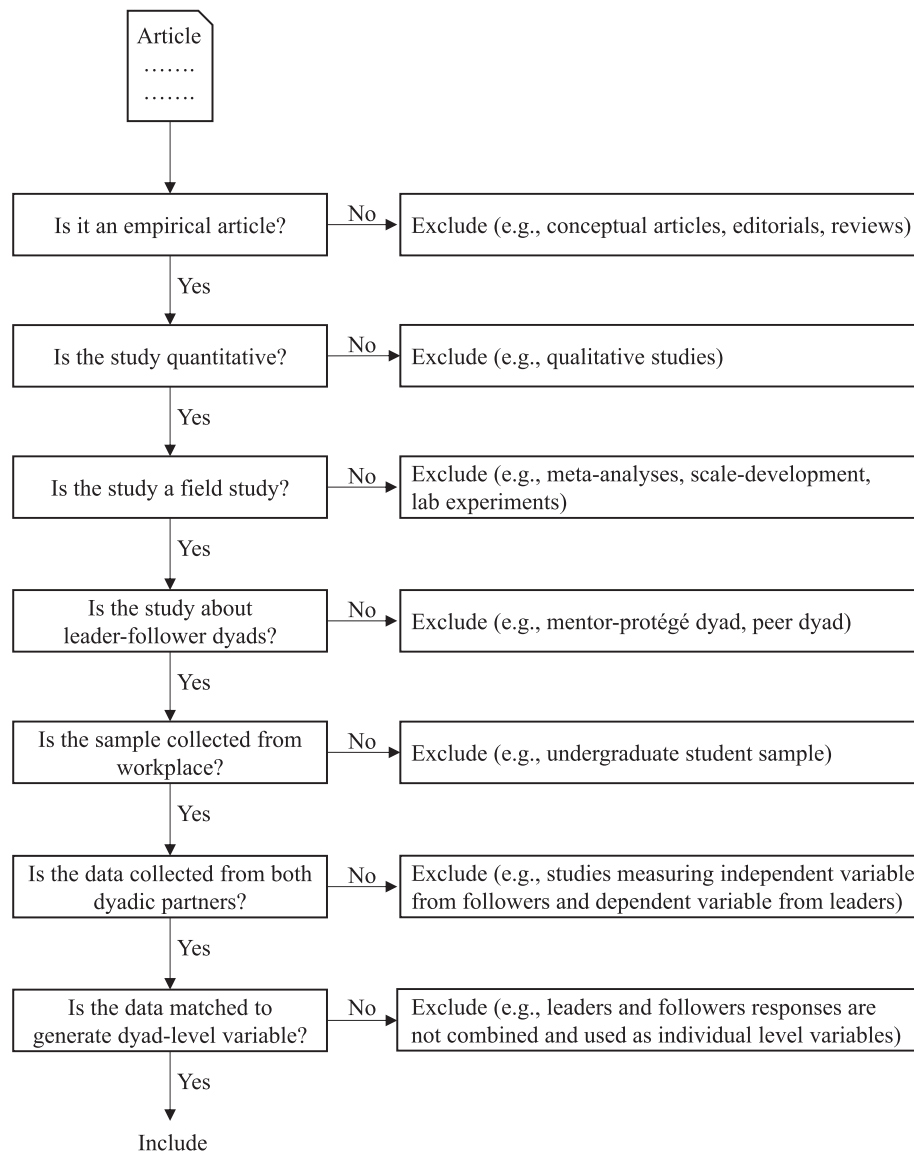


Fig. 1. Article screening process based on inclusion criteria.

based on a levels of analysis framework. To ensure accurate coding, all coders received extensive training to familiarize themselves with the coding scheme and process. The training was conducted in two phases. In the first phase, coders coded ten articles individually and met to compare the results. If any discrepancies were found, coders discussed differences to reach an agreement and a consensus code. In the second practice session, four coders were split into two pairs. After individually coding another 10 articles, coders met their partner to discuss the coding results and reach an agreement. After discussing within each pair, all coders met to review results that were agreed upon within the pairs. From this discussion, coders were able to cross-check the results between coding pairs. After the two complete practice sessions, all coders coded all 79 articles by following the process of coding independently, discussing the results with a partner, and checking the results with the other pair.

Coding scheme

Descriptive information about the articles such as authors, journal, and year of publication were recorded. All variables in the studies were recorded and the types of variables and relationships between the variables were specified. This information was used to answer RQ3 on

the nomological network of leader-follower dyads. The theoretical basis of the studies, the type of dyads from which the study collected data, and the analytic methods were coded to answer RQ1, RQ2a, and RQ2b, respectively. For studies that used theories and methods other than the five theories and four primary methods discussed above, coders used an 'other' code and noted the name of the other theories and methods. In addition, studies that used multiple theories or methods were given multiple codes. To answer RQ4, all variables included in the hypotheses involving dyadic variables were considered, and levels and dimensions (i.e., affect, behavior, cognition, and demographics) of these variables were coded. For example, when a variable was measured from both the leader's and follower's perspectives and combined, the level of the variable was coded as 'dyad'. On the other hand, when the variable was measured from either leader or follower, but not both, the level of the variable was coded as 'individual'. Dimensions of each variable were coded as affect, behavior, cognition, or demographics based on the conceptualization.

Results

Seventy-nine articles included in the current review can be summarized by published years as shown in Fig. 2. Since 1971, the number

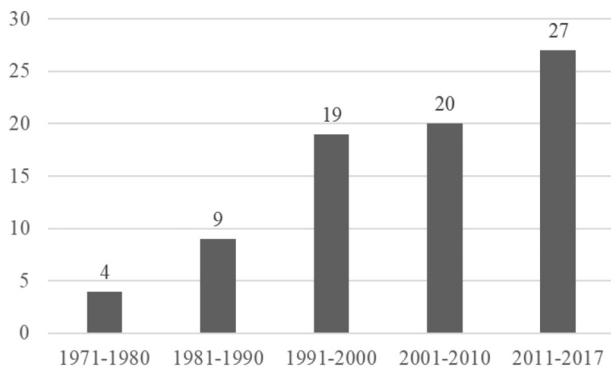


Fig. 2. Included leader-follower dyad studies by years.

Table 3
Summary of leader-follower dyad studies: theory.

Theory code	1	2	3	4	5	6	Total
1	3	1					4
2	1	3					4
3			5		20	2	27
4				0			0
5			20		35	4	59
6			2		4	6	12
Total	4	4	27	0	59	12	106

Note. 1 = VDL, 2 = Individualized leadership, 3 = LMX, 4 = Relational leadership, 5 = Leader-follower congruence, and 6 = Other. Number of articles with one theory is presented on the diagonal and number of articles using multiple theories is presented in the cells of the code combinations. Twenty-seven articles using multiple theories (located off-diagonal) have been counted twice, leading to a total of 106 (= 79 + 27).

of leader-follower dyads studies that include a dyad-level variable has been increasing continuously.

RQ 1 results

A summary of leader-follower dyad articles by theory is presented in Table 3. Forty-six articles used one of the five theories reviewed above (presented on the diagonal of Theory Code 1 to 5 in Table 3), six articles used one or multiple other theories (presented on the diagonal of Theory Code 6), and 27 articles used either a combination of one of the five theories and other theories or a combination of two of the five theories to explain the phenomenon of interest (presented on the off-diagonal of Table 3). Among the 46 articles that used one theory, leader-follower congruence (35 articles) was the most used theory for leader-follower dyad studies, followed by LMX (five articles), individualized leadership (three articles), and VDL (three articles).

Studies on leader-follower congruence mainly focused on investigating the effect of similarity/dissimilarity of leader-follower characteristics (e.g., demographics, individual characteristics) (e.g., Pearce & Xu, 2012; Tsui & O'Reilly, 1989) or a leader's and a follower's perceptions (e.g., Greene, 1972; Wexley & Pulakos, 1983). Specifically, among the 35 articles, 19 articles (54%) studied the effects of demographic similarity. Studies on LMX examined the antecedents or consequences of dyadic LMX (e.g., Olsson, Hemlin, & Pousette, 2012; Schriesheim et al., 2001). Studies on individualized leadership concentrated on testing the levels of support for self-worth and satisfying performance (e.g., Keller & Dansereau, 1995). VDL studies investigated an antecedent of VDL quality (Snyder & Bruning, 1985) and consequences of negotiation latitude (Kozlowski & Doherty, 1989; Rosse & Kraut, 1983).

Six articles that were based on other theories employed transformational leadership, contingent reward leadership, relational control approach, or social exchange theory. Regarding transformational

leadership and contingent reward leadership, the level of the theory and the level of the relationship between leadership behavior and outcomes were investigated (e.g., Yammarino, Dubinsky, Comer, & Jolson, 1997). Relational control approach was used to examine the dyadic conversation pattern (Courtright, Fairhurst, & Rogers, 1989), and social exchange theory was applied to develop an idea on the effect of a leader and a follower's commitment interaction on follower's job performance (Landry & Vandenberghe, 2012).

Regarding the 27 articles that applied two theories, 20 articles were related to both leader-follower congruence and LMX and examined the effect of a leader's and a follower's individual differences congruence on individual LMX perceptions (e.g., Byza, Schuh, Dörr, Spörrle, & Maier, 2017; Tsai et al., 2017) or the effect of LMX agreement on a follower's outcomes (e.g., Matta et al., 2015). Four articles combined leader-follower congruence and other theories (e.g., transformational leadership, guanxi), two articles used LMX and other theories (e.g., transformational leadership, resource dependence theory), and one article was based on VDL and individualized leadership.

Summary

The results showed that the majority of the studies concentrated on leader-follower congruence or LMX and predicted outcomes of the leader-follower relationship. In contrast, studies that used process-oriented theories, such as individualized leadership and relational leadership theory, were relatively limited. Interestingly, several other theories such as transformational leadership and contingent reward leadership were applied to study leader-follower dyadic phenomenon.

RQ 2a results

The type of dyads assessed or used in each study is summarized in Table 4. Studies were coded as operationalizing the dyads as independent dyads when the number of leaders and followers in the sample were identical, and as dependent dyads when dyad data were collected from groups/teams and the number of leaders and followers were different (i.e., a leader had multiple followers). For dependent dyads studies, we coded whether the nested nature of the data was considered in the analyses. Studies that did not report the number of both leaders and followers were coded as not specifying the type of dyads.

Of 79 articles, 19 articles specified that dyadic data were collected from independent dyads, 41 articles were based on data collected from dependent dyads, 17 articles (22%) did not specify the type of dyads used in the study, and two articles conducted multiple studies with different operationalizations. For example, Guarana and Barnes (2017) collected data from independent dyads for the first study and from dependent dyads for the second study; and Paustian-Underdahl, King, Rogelberg, Kulich, and Gentry (2017) did not provide adequate information to discern the type of dyads in one study and collected dependent dyad data in the other study. Regarding the 43 articles that used data from dependent dyads, including two articles that

Table 4
Summary of leader-follower dyad studies: type of dyads.

Operationalized as	Count	Conducted test for levels ^a (in case of dependent dyads)
Independent dyads	19	
Dependent dyads	41	Yes: 25 No: 16
Not specified	17	
Multiple	2	Yes: 2
Total	79	

Note.

^a Yes: considered nesting of dyads in analysis; No: did not consider nesting of dyads in analysis.

operationalized the dyads differently across studies, 27 articles (63%) considered the nesting of dyads within groups or teams.

The 27 articles used different methods to take the group-level effects into consideration. WABA was used to directly test whether the levels of the relationship of interest were at the dyad or group level (e.g., Yammarino & Dubinsky, 1994). Some studies used aggregation tests (i.e., ICC) to either eliminate the possibility of group-level effect (e.g., Tsai et al., 2017) or aggregate a group-level variable (e.g., Colbert, Kristof-Brown, Bradley, & Barrick, 2008). In the case of studies employing multilevel modeling, variables related to leaders were included as group-level variables to either control the nesting of dyads under a common leader or explain group-level effects (e.g., Guarana & Barnes, 2017; Kant, Skogstad, Torsheim, & Einarsen, 2013).

Summary

As independent dyads (i.e., one leader and one follower) and dependent dyads (i.e., one leader and multiple followers) are conceptually distinct, and have the potential to involve different levels of analysis (Gooty & Yammarino, 2011), the type of dyads included in the study needs to be specified and the requisite proper methodological attention should be given to the specified dyadic type (Tse et al., 2018). Although most studies discussed the type of dyads, some studies failed to specify this explicitly. Moreover, among the studies that collected data from dependent dyads, approximately one third of the studies did not consider the nesting of dyads within a group. The results suggest room for improvement in specifying the type of dyads and implementing methodological rigor when studying dependent dyads.

RQ 2b results

A summary of leader-follower dyad articles by method is shown in Table 5. Twenty-six articles used one of the four dyadic research methods (i.e., multilevel modeling, polynomial regression/response surface methodology, WABA, APIM/OWM) reviewed above (presented on the diagonal of Method Code 1 to 4 in Table 5), eight articles used either a combination of one of the four methods and other methods or a combination of two of the four methods (presented on the off-diagonal of Table 5), and 45 articles used other methods (presented on the diagonal of Method Code 5 in Table 5).

Among the 26 articles that used one of the four methods, multilevel modeling and WABA (nine articles each) were the most used method, followed by polynomial regression (seven articles), and APIM/OWM (one article). Multilevel modeling was used to consider both dyad-level effects and group-level effects, such as group phenomenon (e.g., Chun, Cho, & Sosik, 2016) or leader-specific effects in groups (e.g., Triana, Richard, & Yücel, 2017). WABA was employed to test whether the variables and associations of interest operated at the dyad level (e.g., Markham, Markham, & Smith, 2015). Polynomial regression was implemented in studies that focused on the effect of congruence and

Table 5
Summary of leader-follower dyad studies: method.

Method code	1	2	3	4	5	Total
1	9	1	2		1	13
2	1	7			1	9
3	2		9		3	14
4				1		1
5	1	1	3		45	50
Total	13	9	14	1	50	87

Note. 1 = Multilevel modeling, 2 = Polynomial regression/response surface methodology, 3 = WABA, 4 = APIM/OWM, and 5 = Other. Number of articles with one method is presented on the diagonal and number of articles using multiple methods is presented in the cells of the code combinations. Eight articles using multiple methods (located off-diagonal) have been counted twice, leading to a total of 87 (=79 + 8).

incongruence of a leader's and a follower's characteristics/perceptions (e.g., Matta et al., 2015).

Regarding the eight articles that used at least one of the four reviewed methods and another method, two articles that used multilevel modeling conducted WABA as an additional test for levels of the phenomenon of interest (Douglas, 2012; Gooty & Yammarino, 2016), one article that conducted structural equation modeling used WABA to justify aggregation of the variable of interest (Clarke & Mahadi, 2017), two articles that employed WABA as a primary method used additional methods such as structural equation modeling (Dansereau et al., 1995) and correlations (Keller & Dansereau, 1995), two articles that applied polynomial regression used either multilevel modeling to eliminate the possibility of group-level effects when using dependent dyad data (Tsai et al., 2017) or structural equation modeling for mediation tests (Colbert et al., 2008), and one article that had two studies employed regression and multilevel regression for each study (Paustian-Underdahl et al., 2017).

Other methods used in the 45 articles were multiple linear regression (21 articles), ANOVA/MANOVA (10 articles), structural equation modeling/path analysis (five articles), correlation (four articles), a mix of these methods (e.g., correlation and regression, ANOVA and regression) (three articles), Grizzle, Starmer, and Koch (GSK) approach (one article) (Courtright et al., 1989), and Simon-Blalock technique (one article) (Greene & Organ, 1973). Studies using multiple linear regression used difference scores to represent dyad characteristics (e.g., Tsui & O'Reilly, 1989), and studies using ANOVA/MANOVA employed categories of dyads to examine the difference in the outcomes of interest (e.g., Sherman, Kennedy, Woodard, & McComb, 2012).

Summary

Less than a half of the articles (34 out of 79 articles) used at least one of the methods reviewed here, and the rest of the articles used other methods such as multiple regression and ANOVA/MANOVA. Among the four reviewed dyadic research methods, when used either separately or in some combination, WABA was the most utilized method and APIM/OWM (Kenny et al., 2006) was the least utilized method. The low usage of APIM/OWM may be due to its relatively recent introduction compared to the other methods (i.e., multilevel modeling, WABA, polynomial regression). Given that APIM/OWM can explain various research questions about dyads (for sample research questions, see Krasikova & LeBreton, 2012; Tse et al., 2018), more attention is needed to this method.

RQ 3 results

In total, 224 hypotheses that included at least one dyad-level variable were coded and 132 hypotheses received empirical support. Based on the supported hypotheses for direct and indirect effects, we generated a nomological network of leader-follower dyads research as shown in Figs. 3, 4, and 5.

Three clusters emerged in the nomological network and each cluster included different set of theories. The first cluster (Fig. 3) included core variables of VDL (i.e., negotiation latitude), LMX, and leader-follower congruence; the second cluster (Fig. 4) was based on VDL and individualized leadership (i.e., support for self-worth, satisfying performance); and the third cluster (Fig. 5) was composed of variables studied using other leadership theories (e.g., transformational leadership, contingent reward leadership).

In Fig. 3, leader-follower (in)congruence was central, as it predicted numerous individual-level, both leader-related and follower-related, outcomes. Leader-follower (in)congruence variables were further categorized as demographics/individual differences (e.g., race, gender, personality, competence), cognition- (e.g., relational schema, role perceptions), affect- (e.g., anger, affectivity), and behavior- (e.g., conflict resolution strategy) based variables. Among the four categories, affect- and behavior-based variables were less studied compared to

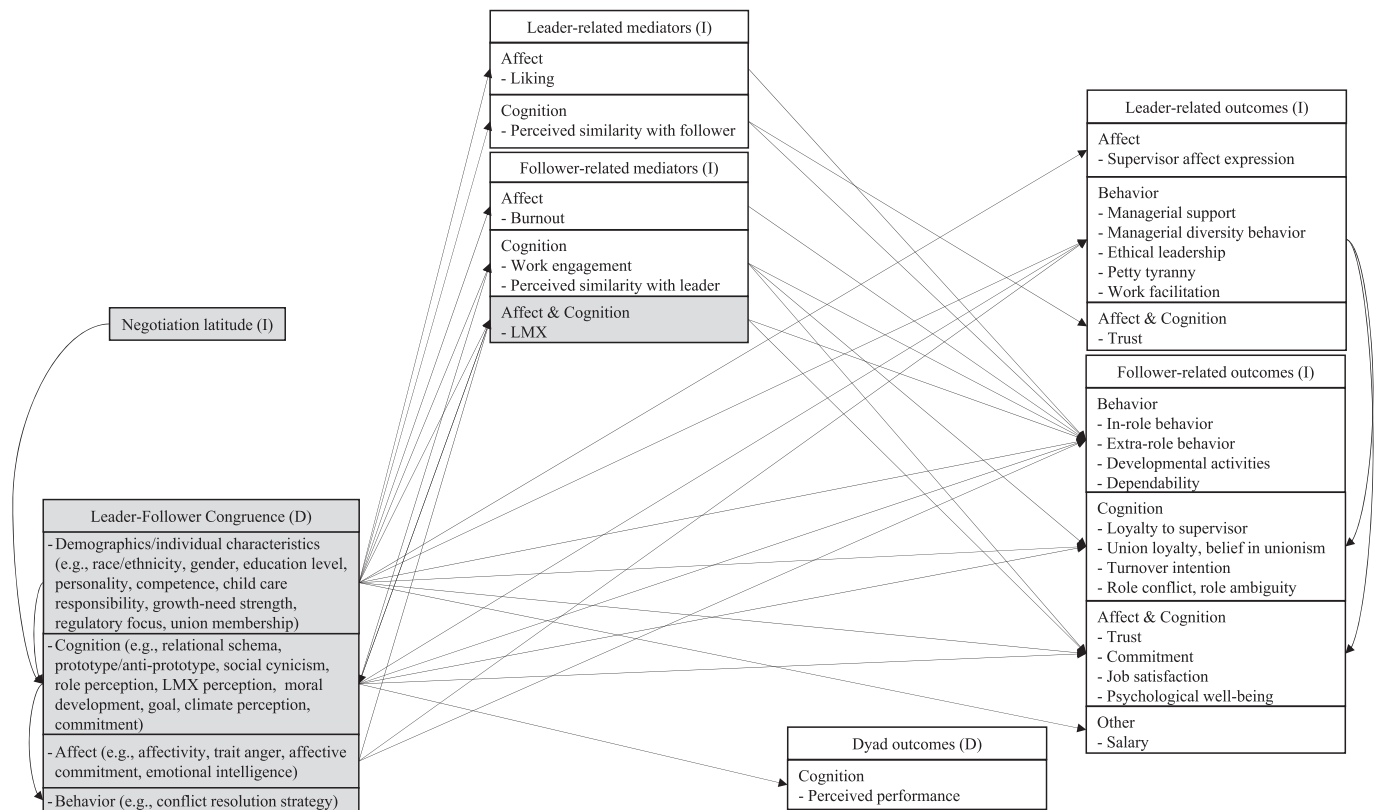


Fig. 3. Note: (I): individual level; (D): dyad level; Constructs/Variables in five leader-follower dyads theories are shaded. Nomological network of leader-follower dyads research – cluster 1 (VDL, LMX, leader-follower congruence).

demographics/individual differences-based variables and cognition-based variables. While demographics/individual differences-based variables and cognition-based variables had either direct or indirect effects, affect-based variables only had direct effects on outcomes (e.g., individual-level LMX, in-role behavior). Several mediators were identified for the relationship between leader-follower congruence and follower-related individual-level outcomes (e.g., in-role behavior, extra-role behavior, job satisfaction, trust, commitment) and follower-rated LMX was one of the mediators.

Regarding LMX at the dyad level, two different approaches emerged in the nomological network. The first approach, which was examining the effect of LMX agreement (i.e., congruence) between a leader and a follower (e.g., Markham et al., 2010; Matta et al., 2015; Sherman et al., 2012), appeared in the first cluster (Fig. 3). As this approach reflects the congruence between a leader's and a follower's perception, it was categorized under cognition-based leader-follower congruence. LMX

agreement predicted perceived performance at the dyad level, a follower's work engagement, extra-role behavior, and turnover intention.

The second approach to study LMX at the dyad level, which was generating a dyad-level LMX score as an aggregate of leader-rated and follower-rated LMX, appeared in the third cluster (Fig. 5). This aggregated LMX score was used to mediate the effect of individual-focused transformational leadership occurring at the dyad level and follower's in-role and extra-role behavior (Chun et al., 2016) and the relationship between the leader's emotional intelligence and follower-related outcomes such as psychological well-being and turnover intention (Clarke & Mahadi, 2017).

Fig. 4 was formulated around VDL and individualized leadership. Different dyad-level variables were present and the relationships among the variables were either causal or based on covariations (Keller & Dansereau, 1995; Markham et al., 2015; Yammarino & Dubinsky, 1992).

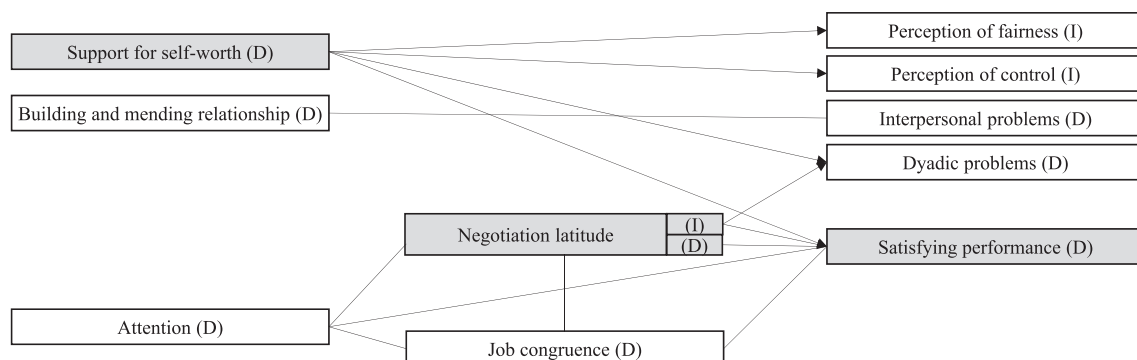


Fig. 4. Note: (I): individual level; (D): dyad level; Constructs/Variables in five leader-follower dyads theories are shaded. Nomological network of leader-follower dyads research – cluster 2 (VDL, individualized leadership).

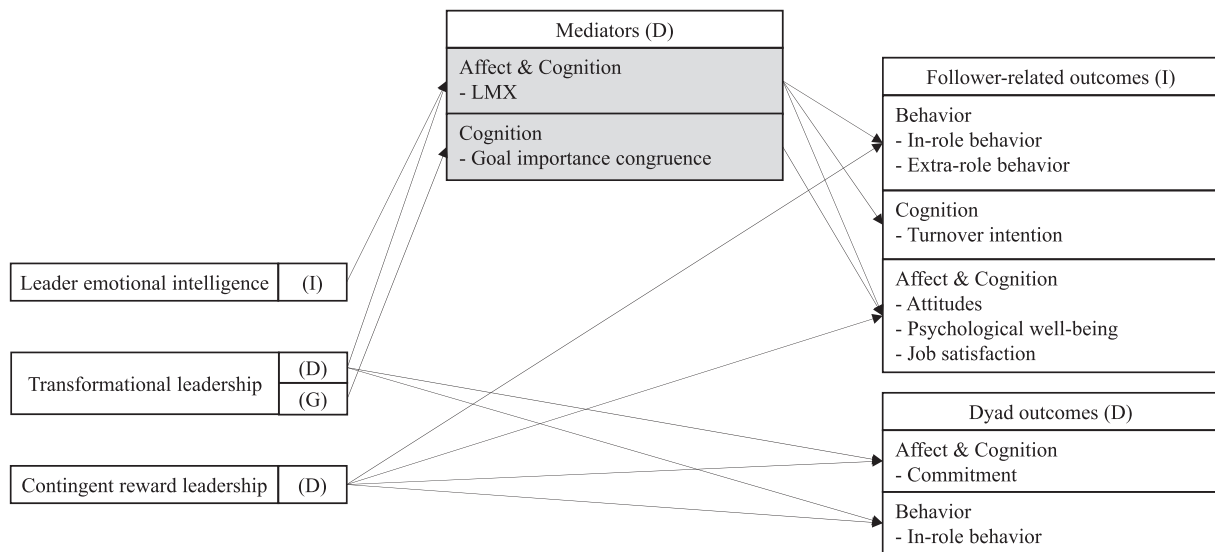


Fig. 5. Note. (I): individual level; (D): dyad level; (G): group level; Constructs/Variables in five leader-follower dyadstheories are shaded. Nomological network of leader-follower dyads research – cluster 3 (other theories).

As shown in Fig. 5, transformational leadership and contingent reward leadership were also studied at the dyad level. Transformational leadership was an antecedent of dyad-level LMX, dyad-level performance, and shared perception of subordinate commitment at the dyad-level (Chun et al., 2016; Yammarino et al., 1997). Dyad-level contingent reward leadership predicted a follower's outcomes such as job satisfaction, extra-role performance, and in-role performance (Chun, Yammarino, Dionne, Sosik, & Moon, 2009). In addition, contingent reward leadership was also related to dyad-level performance and shared perception of subordinate commitment at the dyad level (Yammarino et al., 1997).

Summary

The nomological network included three clusters. The first cluster was built based on leader-follower congruence and LMX. The second cluster was formulated with variables mainly studied from an individualized leadership standpoint and included multiple dyad-level variables (e.g., negotiation latitude, support for self-worth, satisfying performance). The third cluster included other theories studied at the dyad-level (i.e., transformational leadership, contingent reward leadership). Most of the outcomes in the first cluster were individual-level outcomes such as performance, job satisfaction, and turnover intention. Among the studies on leader-follower congruence, most of the studies focused on a leader's and a follower's individual differences that were manifested before the dyadic relationship began (e.g., demographics, personality).

In the nomological network, LMX has been employed more as an individual-level variable than a dyad-level variable. Only two antecedents of dyad-level LMX were identified and outcomes of dyad-level LMX were all individual-level outcomes. In line with Gooty et al. (2012)'s review on levels issue in LMX research, despite LMX being one of the most studied leader-follower dyadic phenomena, relatively little is known about dyad-level LMX.

RQ 4 results

Variables investigated in leader-follower dyads studies can be categorized into either variables that represent characteristics of dyads (i.e., dyad-level variables) or outcome variables operating at levels other than dyad level. A list of dyad-level variables and dimensions of each variable is presented in Table 6, and a list of outcome variables and dimension of each variable is summarized in Table 7. Dimensions

were determined based on the conceptualization of each variable and coded as affect, behavior, cognition, or demographics.

In total, 50 dyad-level variables were identified. Among the identified variables, 44 variables were used as one type of variable with 25 variables as an independent variable, 7 variables as a moderator, one variable as a mediator, and 11 variables as a dependent variable. Six variables were used as multiple types of variables and, among them, three variables were used as both an independent variable and a dependent variable.

Regarding the dimensions of the variables, 34 out of 50 were based on cognition. The majority of cognition-based variables were related to (dis)similarity or (in)congruence between two individuals' characteristics (e.g., competence, growth-need strength, social cynicism, relational schema, implicit leadership theory) or perceptions of particular target such as relationship quality (i.e., LMX), role, or performance rating. Seventeen variables were conceptually related to behavior occurring within dyads such as attention, building and mending relationship, leadership behavior, support for self-worth, and performance (i.e., considering both a subordinate's performance and a supervisor's effectiveness). Of the 10 variables categorized as affect variables, except (dis)similarity or (in)congruence of anger, emotional irritation, and emotional intelligence between a leader and a follower, all variables were conceptually a mix of the affective aspect and cognitive aspect such as LMX, satisfaction, and commitment. Four variables were identified as capturing relatively objective characteristics such as demographics (e.g., race, gender, education level), dyadic tenure, relationship type, and guanxi as a former relationship type between a leader and a follower.

Individual-level outcomes studied in leader-follower dyads studies (Table 7) were categorized into follower-related outcomes and leader-related outcomes. Forty-two variables were identified as follower-related outcomes. In terms of the conceptual dimensions of the follower-related outcomes, cognition (27 variables) was the most studied aspect, followed by behavior (13 variables) and affect (nine variables). Among the follower-related outcomes, nine variables (e.g., organizational commitment, job satisfaction, trust) were considered to be capturing multiple aspects (e.g., affect and cognition, behavior and cognition).

Regarding leader-related outcomes, 18 variables were found and behavior (12 variables) was the most studied dimension, followed by affect (six variables) and cognition (five variables). Among the leader-related outcomes, four variables (e.g., managerial support, leader effectiveness) were a mix of multiple dimensions (e.g., affect and

Table 6
Dimensions of dyad-level variables used in leader-follower dyads research.

Type ^a	Variable	Dimensions			
		Affect	Behavior	Cognition	Demographics
IV	Attention		X		
IV	Building and mending relationship		X	X	
IV	Contingent reward leadership		X		
IV, MOD	(In)congruence – demographics				X
IV	(In)congruence – affective commitment	X		X	
IV	(In)congruence – anger	X			
IV	(In)congruence – cognitive moral development			X	
IV	(In)congruence – commitment - other		X	X	
IV	(In)congruence – communication style		X	X	
IV	(In)congruence – competence			X	
IV	(In)congruence – emotional intelligence	X			
IV	(In)congruence – growth-need strength			X	
IV	(In)congruence – political skills		X		
IV	(In)congruence – power			X	
IV	(In)congruence – personality	X	X	X	
IV	(In)congruence – regulatory focus			X	
IV	(In)congruence – social cynicism			X	
IV	(In)congruence – relational schema			X	
IV	(In)congruence – implicit leadership theory			X	
IV, MOD, DV	(In)congruence – LMX perception	X	X	X	
IV	(In)congruence – attribution conflict			X	
IV, MED, DV	(In)congruence – role, job content perception			X	
IV, DV	(In)congruence – other perception			X	
IV	Guanxi				X
IV, MOD	Interaction/relationship type				X
IV	Interpersonal problems		X	X	
IV	Job latitude			X	
IV	Job congruence			X	
IV, MED	LMX	X		X	
IV	Support for self-worth		X	X	
IV	Transformational leadership		X		
MED	(In)congruence – goal importance			X	
MOD	(In)congruence – emotional irritation	X			
MOD	(In)congruence – meaning of work			X	
MOD	(In)congruence – self-efficacy			X	
MOD	(In)congruence – individual characteristics			X	
MOD	Dyadic tenure				X
MOD	Role clarity			X	
MOD	Role conflict			X	
DV	Commitment	X		X	
DV	Conflict (in conversations)		X		
DV	Conflict resolution strategy		X		
DV	Discussion (in conversations)		X		
DV	Dyadic problems			X	
DV	(In)congruence – performance ratings			X	
DV	Influence tactics		X		
DV	Performance		X	X	
DV	Satisfaction	X		X	
DV	Satisfying performance	X		X	
DV	Subordinate's extra effort		X		
Total	50	10	17	34	4

Note.

^a IV: independent variable; MED: mediator; MOD: moderator; DV: dependent variable. All are dyad-level (and not individual-level) variables.

cognition, affect and behavior, mix of all three dimensions).

Summary

In terms of dyad-level variables, a small number of variables were identified as outcome variables and most of the variables were either independent variables or moderators. In other words, few variables have been investigated as purely dyadic outcomes. In addition, dimensions of dyad-level variables were mostly cognitions.

With regard to outcomes of leader-follower dyads, all variables were at the individual level and mostly related to followers. Again, outcomes were also heavily focused on cognitive aspects. These results guide future research to further explore and investigate more dyad-level outcomes and consider dimensions other than cognitions.

Discussion

By focusing on the dyad level in the realm of leadership and going beyond extant reviews on leader-follower dyads (e.g., Krasikova & LeBreton, 2012; Liden et al., 2016), LMX research (e.g., Gooty et al., 2012; Tse et al., 2018), and LMX agreement (e.g., Sin et al., 2009), the current review broadly examined empirical findings in leader-follower dyads research with consideration of both theories and methods employed in leader-follower dyads studies. Given our focus on pure dyads studies, we excluded individual-level relationship perceptions studies (e.g., all variables are at the individual level). Articles that met the inclusion criteria were coded to address research questions on the theoretical basis of each study, the usage of dyadic research methods, the nomological network of leader-follower dyadic phenomena, and the

Table 7
Dimensions of individual-level outcome variables in leader-follower dyads research.

Leader/follower	Variable	Dimensions			
		Affect	Behavior	Cognition	Other
Follower	Attitude	X		X	
	Belief in unionism			X	
	Commitment	X		X	
	Dependability		X		
	Developmental activities		X		
	Dominance		X		
	Employee self-development			X	
	Equity perception			X	
	Extra-role behavior (e.g., OCB)		X		
	Idea generation		X		
	Influence in decision making		X		
	Ingratiation	X	X		
	In-role behavior (e.g., task performance, creative performance)		X		
	Intent to remain			X	
	Job burnout	X			
	Job Satisfaction	X		X	
	Level in the organization				X
	LMX	X		X	
	Loyalty to supervisor			X	
	Met expectation			X	
	Nurturance		X		
	Organizational commitment		X	X	
	Perception of control			X	
	Perception of fairness			X	
	Performance (rating)			X	
	Procedural justice			X	
	Psychological well-being	X		X	
	Quality of communication			X	
	Responsibility to the union			X	
	Role ambiguity			X	
	Role conflict			X	
	Salary				X
	Satisfaction with the supervisor	X		X	
	Talk time		X		
	Trust	X		X	
	Turnover (actual)		X		
	Turnover intentions			X	
	Union loyalty			X	
	VDL quality			X	
	Willingness to work for the union			X	
	Work engagement			X	
	Work withdrawal		X		
Subtotal (follower)	42	9	13	27	2

Table 7 (continued)

Leader/follower	Variable	Dimensions			
		Affect	Behavior	Cognition	Other
Leader	Affect expression	X			
	Delegation		X		
	Diversity behavior		X		
	Dominance		X		
	Ethical leadership		X		
	Idea generation		X		
	Influence in decision making		X		
	Leader effectiveness	X	X		
	Liking for leader	X			
	LMX	X			X
	Managerial support	X	X	X	
	Nurturance		X		
	Petty tyranny		X		
	Quality of communication			X	
	Respect for leader			X	
	Talk time		X		
	Trust	X		X	
	Work facilitation		X		
Subtotal (leader)	18	6	12	5	0
Total	60	15	25	32	2

Note. All are individual-level (and not dyad-level) variables.

dimensionality of variables covered in dyads research.

Our review results indicate that little has been uncovered in terms of pure dyadic phenomena between leaders and followers. In other words, leader-follower dyads research field has a potential to expand widely in the future. By looking at the nomological network generated and the summary on the usage of theories on leader-follower dyads from this review, researchers will be able to identify areas that need future investigation for replication and to expand the nomological network to enhance our knowledge of dyadic phenomena. Moreover, researchers can try replicating the findings of leader-follower dyadic phenomena investigated with early methods (e.g., multiple regression; ANOVA/MANOVA) by employing more contemporary methods suggested for dyadic research, when applicable.

In general, to expand our understanding of leader-follower dyads, future studies on leader-follower dyads should pay closer attention to the levels of theory, measurement, analysis, and inference, as suggested by other reviews on levels of analysis issues in leadership research (e.g., Dionne et al., 2014; Gooty et al., 2012; Yammarino et al., 2005). Additionally, future research can align the levels issues at the dyad level by addressing research questions on areas that have gained limited interest in the nomological network of leader-follower dyads and employ dyad-level analysis with matched data collected from both leaders and followers.

Based on the findings of the current review, we can summarize when it is necessary to consider both the leader's and follower's perspective and make suggestions in terms of future research questions and methods to further develop the areas that received limited attention in leader-follower dyads research. For example, it is important to take a dyadic perspective when researchers are interested in dyadic phenomena such as:

1. Interaction process, reciprocity, and/or exchange between a leader and a follower;
2. The interplay of a leader's and a follower's individual characteristics;
3. The agreement/disagreement between a leader's and a follower's perceptions; and.
4. Emergent properties, components, and characteristics of dyadic relationships.

Additionally, sample research questions that can be addressed by

taking a dyadic perspective include:

1. What underlies the formulation of dyadic relationships and how do the components interact to build the relationships? (e.g., Other than LMX, what are the characteristics of low/high performing dyads and do they operate at the dyad level?; In addition to support for self-worth and satisfying performance, what can be exchanged within a dyad to increase the interdependency of a leader and a follower within a dyad?)
2. What properties emerge after interactions/exchange between a leader and a follower and how long do these elements take to emerge within the dyad?
3. For leader-follower congruence studies, what affect- and behavior-based individual differences can be matched in a dyad to predict individual and dyadic outcomes?
4. What dyad characteristics can impact better/worse leader-follower congruence (e.g., relationship perceptions)?
5. What dyad-level consequences can be predicted from leader-follower dyadic relationships? (e.g., Can individual-level outcomes studied in leader-follower congruence studies also be examined at the dyad-level? What are the dyad-level outcomes of low/high-quality dyadic relationships?)

Finally, suggestions for methodology include:

1. When interested in dyadic phenomenon, collect data on the variable of interest from both a leader's and a follower's perspective and combine, when appropriate, responses from the two perspectives to generate a dyad-level variable. When aggregation of dyad scores of the focal variable is necessary, test the level of the variable via WABA or some other appropriate technique after combining the responses.
2. Specify the type of dyads (i.e., independent vs. dependent dyads) collected in the study by providing the number of both leaders and followers in the sample.
3. When dyads are dependent (i.e., nested within groups having one leader and multiple followers), consider the dependency in the analysis by either testing the potential group-level effects through WABA or calculating ICCs, for example, before conducting dyad-level analyses, or conduct multilevel (random coefficient) modeling to consider both dyad-level effects and group-level effects (see Gooty & Yammarino, 2011; Yammarino & Gooty, 2019).

In a more general way, we believe the results of this review point toward several broad potential future directions for research related to leader-follower dyads. First, there is a great need to unpack and explore the temporal dynamics of leader-follower relationships. The process-oriented theories related to leader-follower dyads (e.g., individualized leadership and relational leadership theory) have received very little empirical attention from a pure dyad perspective. This is unfortunate as dyadic phenomena do not always emerge from leader-follower interactions (see Gooty & Yammarino, 2011; Yammarino & Gooty, 2017), and it would be helpful to know how the various temporal dynamics suggested by existing theories inform our understanding of these realities. Moreover, given the potential value of high quality leader-follower dyadic relationships to positively impact an array of important outcomes (e.g., Dansereau et al., 1984; Gooty & Yammarino, 2016; Markham et al., 2010), it would be insightful to enhance understanding of factors that could accelerate the rate of development for these relationships.

There is no doubt that the longitudinal studies needed to explore such leader-follower relationships are challenging: they require intensive repeated data collection and additional modeling complexities (e.g., Bliese & Lang, 2016; Ployhart & Vandenberg, 2010). However, recent advances in big data and the increasing availability of “digital traces” (Kozlowski, Chao, Chang, & Fernandez, 2015) may ease the

collection of repeated data for both leaders and followers. Additionally, there are likely to be ways to combine existing dyadic data analysis methodologies with multilevel modeling and other growth modeling techniques (e.g., Bliese & Ployhart, 2002) to address modeling complexities. Lastly, there are potentially interesting ways in which computational models/agent-based simulations can be coupled with targeted empirical studies (cf. Grand, Braun, Kuljanin, Kozlowski, & Chao, 2016) to shed light on and investigate important temporal aspects involved with the development and maintenance of leader-follower dyadic phenomena.

Second, there is room to further investigate the conceptual complexities involved with dependent leader-follower dyads. While this review demonstrates that these types of dyads are common, much of existing research has focused on the methodological implications of these dyads. The unique theoretical implications associated with these types of dyads, such as the potential for there to be contagion and other diffusion effects among leader-follower dyads in a given group and the possibility for characteristics associated with follower-follower dyads to impact leader-follower dyads, have yet to be incorporated into existing theories regarding leader-follower dyads. Such considerations are likely to be particularly important as scholarship in this area more fully investigates the temporal aspects involved with the development and maintenance of leader-follower dyadic phenomena.

Third, we see potential for the use of network-related approaches to examine leader-follower dyadic phenomena. The dyad is a fundamental unit of analysis in network-based approaches, and it offers the added benefit of providing the ability to visualize and explore the broader pattern and configuration of dyads in a given unit (Borgatti & Foster, 2003; Borgatti, Mehra, Brass, & Labianca, 2009; Wasserman & Faust, 1994). Despite these applicable and potentially insightful aspects of network-based methods, this review did not identify any “pure” dyad leadership studies that used network techniques. There is thus an opportunity to leverage network approaches, particularly exponential random graph models (Kim, Howard, Pahnke, & Boeker, 2016; Lusher, Koskinen, & Robins, 2013) and associated multilevel extensions (Wang, Robins, Pattison, & Lazega, 2013; Zappa & Lomi, 2015), in future leader-follower dyads studies.

Fourth, there are opportunities to explore the bottom-up impact of dyad-level phenomena and outcomes on phenomena at a higher-level of analysis beyond the dyad. While this review found that the examination of dyad-level outcomes was relatively rare (especially when compared to the emphasis on outcomes at the individual level), consideration of the impact at the group/team or higher levels of analysis was practically nonexistent. This is surprising as dyads are frequently referred to as the fundamental building blocks of groups/teams and are likely to play an important role in the emergence of a variety of group/team phenomena (e.g., cohesion, trusting environment, climate) (e.g., Liden et al., 2016). Moreover, prior research suggests that leader-follower dyads are likely to be a particularly salient set of dyads in a given group/team (Bass, 2008; Gooty & Yammarino, 2011; Yammarino & Gooty, 2017). We therefore see possibilities for future theoretical and empirical research on leader-follower dyads to enhance understanding of how the dynamics and outcomes associated with these dyads can impact phenomena and outcomes at the group/team levels of analysis.

Finally, given our review of pure leader-follower dyad relationships, we believe it is premature to offer specific practical implications when we do not know much about leader-follower dyads yet. If leader-follower dyads research expands by addressing more diverse research questions and including more constructs, and the findings are replicated, then we would be able to provide practical implications such as how to build high-performing dyadic relationships, how to manage low-quality dyadic relationships, and what leaders and followers can expect from their good/poor dyadic relationships. Until that point in the development of this line of research (i.e., more data, more replications, better understanding of foundational issues), we believe that it is prudent scientifically to avoid asserting practical implications when

they are not warranted or may be inaccurate.

Conclusion

The current review presents a summary of leader-follower dyads research and identifies areas that have been understudied and require additional theoretical and empirical attention. We also have provided suggestions regarding several new promising directions for future research on leader-follower dyads to explore. Our overall hope is that these findings stimulate greater specificity in future leader-follower dyads research, increase the appropriate investigation of purely dyadic phenomena between leaders and followers, and lay the groundwork for a new wave of research related to leader-follower dyads.

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