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LMX Differentiation and Group Outcomes: A Framework and Review Drawing on Group Diversity Insights

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In this review, we address inconsistencies and a lack of clarity in the study of leader-member exchange (LMX) differentiation and group outcomes. We do so by drawing on another highly visible group dispersion literature in the management domain, group diversity, based on the recognition that LMX quality is a characteristic on which group members vary. Utilizing insights from Harrison and Klein's typology of group diversity constructs, we introduce a framework that specifies the meaning and shape of three variations of differentiated leader-member relationships in groups and connects each construct with implications in terms of theorizing and measurement. Specifically, our framework conceptualizes LMX differentiation as LMX separation (dispersion in LMX relationships as disagreement or opposition regarding an opinion, perception, or position), LMX variety (dispersion in LMX relationships as distinctiveness in kind, source, or category), and LMX disparity (dispersion in LMX relationships as inequality in concentration of valued social assets or resources). We then apply this framework to conduct a systematic review of the LMX differentiation literature with particular attention to alignment among a study's descriptions of the construct, application of theory, expected group outcomes, and construct measurement. Finally, we offer recommendations for future research and for applying our framework to enhance reliability, validity, and generalizability in studies of LMX differentiation and group outcomes.

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An essential assertion in leader-member exchange (LMX) theory (Graen & Uhl-Bien, 1995) is that leaders differentiate among their followers (Yu, Matta, & Cornfield, 2018). For many years, this phenomenon, known as LMX differentiation (LMXD) (Henderson, Liden, Glibkowski, & Chaudhry, 2009; Liden, Erdogan, Wayne, & Sparrowe, 2006), was treated as an inevitable reality of leadership in group settings (Dansereau, Graen, & Haga, 1975; Erdogan & Bauer, 2010). Empirical examinations, however, have revealed inconsistent and inconclusive results regarding LMXD's effects on group outcomes.

Leaders who treat group members differently (i.e., high LMXD) can accommodate distinct roles, needs, and preferences of followers, or their unique experiences, capabilities, and skills (e.g., Henderson et al., 2009). Such intentional and strategic differentiation may enable group members with high-quality relationships (the "in-group") to optimize their contributions to group functioning (see Vertical Dyad Linkage Theory [VDL], Dansereau et al., 1975; e.g., Yu et al., 2018), as apparent in positive effects of LMXD on group outcomes (e.g., Lee & Chae, 2017; Sui, Wang, Kirkman, & Li, 2016). However, recent treatments of LMX at the group level encourage leaders to maintain similarly positive relationships with all members (i.e., low LMXD; e.g., newer formulations of LMX theory; Graen & Uhl-Bien, 1995), as LMXD may incite competition (e.g., Hooper & Martin, 2008), encourage subgroups, compromise cohesion (e.g., Stewart & Johnson, 2009), and reduce fairness perceptions (Nishii & Mayer, 2009).

Recent reviews of the LMXD literature conclude that it is rife with contradictory predictions and inconsistent results, as reasonable arguments and empirical evidence exist for both the benefits and pitfalls of LMXD in groups (Liden et al., 2006). Attempts to decipher LMXD effects have included a focus on theoretical underpinnings (e.g., Anand, Vidyarthi, & Park, 2015; Matta & Van Dyne, 2020), interactions with average levels of LMX (e.g., Martin, Thomas, Legood, & Dello Russo, 2018), and various outcome categories (e.g., Yu et al., 2018). Though these summaries provide critical insights and constructive recommendations for future research, each has relied on a traditional, albeit narrow, view of LMXD; one that invokes a simplistic definition of LMX, focused only on overall relationship quality, and estimates LMXD in terms of degree only. In our view, there are important implications of this narrow view.

First, most examinations of LMXD have focused only on the degree of variation of LMX quality without consideration of the concept's complexity. As Martin et al. (2018) suggested, there is a lack of precision in the definitions and measurements of LMXD. Indeed, these have been insufficient in recognizing systematic variations of the concept, characterized by distinct shapes as well as nuanced meanings of LMXD in groups. For example, when leaders differentiate among group members, the resulting shape may reflect two subgroups that are nearly equal in size but differ in terms of quality and intimacy (high vs. low), one or very few members that are favored over the rest, or a spread of relationships informed by the unique skills, capabilities, and contributions of group members. Simplistic treatment of LMXD in groups has limited the concept's explanatory power and generalizability.

Second, lack of precision may explain why so many different, and conflicting, theoretical arguments have been invoked, often misaligned with the underlying construct. Researchers have used a myriad of theories (e.g., equity, Adams, 1965; social identity, Tajfel & Turner, 1986; tournament, Lazear & Rosen, 1981; role system theory, Katz & Kahn, 1978; shared reality, Hardin & Higgins, 1996) to explain the effects of LMXD on groups. Correspondence between construct

definition and theory has not always been clear, which is especially problematic as a construct's meaning depends on the theoretical framework in which it is embedded (Peter, 1981).

Finally, imprecise definitions and misalignment in theory application make measurement choices subject to convention or chance. In general, studies of LMXD rely on a limited set of perceptual measures of overall relationship quality (e.g., Graen & Uhl-Bien, 1995), aggregated to a conventional set of mathematically related statistical indices (e.g., standard deviation [SD], variance [Var]). Measurement choice is consequential given that different indices can yield conflicting effects on common outcomes in the same study (Roberson, Sturman, & Simons, 2007). Measurement choice in general, and in studies of group dispersion in particular, is essentially a choice among *alternative definitions* of a construct, "rather than a choice among alternative ways of measuring a single theoretical construct" (Allison, 1978: 865).

To address these concerns, as called for in Martin et al.'s (2018) review, we bridge "traditional barriers" for advancing fields characterized by equivocal findings and a lack of clarity (Short, 2009: 1312). We draw on insights from Harrison and Klein's (2007) group diversity typology, acknowledging that LMX is a characteristic on which group members *differ* and a distributional property in groups that can "influence social interactions between members [and] consequently group-level processes and outcomes" (Roberson, 2019: 71). These insights include recognition that degree of dispersion alone is insufficient to validly predict the effects of LMXD on group outcomes. As group dispersion comes in different forms ("types"), with unique meanings and shapes as well as consequences for groups, predicting whether and why effects will be positive or negative requires clarifying the type of dispersion first. These insights allow us to systematically capture and discern, for the first time, the three characteristic types of LMXD (LMX separation, disparity, and variety) by their properly specified shapes and meanings, theories, group outcome predictions, and measurements. These in turn serve as a basis for assessing the LMXD literature against a well-established paradigm.

Our review contributes to the literature in three important ways. First, we characterize LMXD in terms of separation, variety, or disparity within groups, consistent with insights from Harrison and Klein's (2007) influential group diversity typology, which then informs theory application, outcome choice, and operationalization. As such, we are the first to offer a guiding, prescriptive framework in which construct choice has clear and actionable implications for theorizing and operationalization. Second, we conduct a systematic review of the literature on LMXD and group outcomes against the background of our framework, which affords us the ability to make a more substantive, objective evaluation of the literature (e.g., the extent to which existing studies achieve alignment in essential study characteristics). We discern patterns of alignment in the existing empirical literature, projecting *mis*alignment as one possible cause of inconsistent and inconclusive findings. Finally, we provide detailed suggestions for representing the varied meanings and shapes of LMXD both conceptually and methodologically and develop an agenda for further research. We anticipate that precision, consistency, and transparency in choices of study characteristics will yield more reliable, valid, and generalizable results.

Conceptual Building Blocks for Literature Review

LMX Theory

LMX, generally defined as overall relationship quality between a leader and follower, is the core concept of LMX theory, a relationship-based approach to leader-follower interaction

(Graen & Uhl-Bien, 1995; Uhl-Bien, 2006). The quality of one's relationship with a leader has meaningful task and social implications for the follower, including differences in status, attention, autonomy, opportunity, or access to information (Liden et al., 2006). LMX theory holds that leaders form distinct relationships with each of their followers (Graen & Uhl-Bien, 1995). Leaders might foster relationships characterized by trust, liking, respect, and social exchange with *some* subordinates in their workgroups, while maintaining distant relationships with others, realized in transactional exchanges (Liden & Maslyn, 1998). Thus, LMXD, generally defined as degree of within-group variability in LMX (e.g., Liden et al., 2006), is a by-product of both leaders and followers choosing to invest in and form distinct relationships with each other (Yu et al., 2018) and occurs in almost all groups (Erdogan & Bauer, 2010; Liden & Graen, 1980). LMXD, unlike mean LMX (Anand et al., 2015), is not consistent in predicting group process, emergent state, and effectiveness outcomes (LePine, Piccolo, Jackson, Mathieu, & Saul, 2008; Mathieu, Tannenbaum, Donsbach, & Alliger, 2014), the primary interest in this review.

Group Dispersion

Group composition models "specify the functional relationships among phenomena or constructs at different levels of analysis" (Chan, 1998: 234). Consistent with early characterizations of LMX distinctions in groups (Dansereau et al., 1975), and common definitions (e.g., Liden et al., 2006), LMXD, like group diversity, adheres to a *dispersion* model of group composition (Chan, 1998). Differences in perceptions of LMX between group members are used to operationalize LMXD at the group level. For an extended description of group composition models in conjunction with LMXD, see Martin et al. (2018).

An important commonality between group diversity and LMXD is that meaning is contained in the *dispersion* on the respective attribute of interest in a group. In both fields, there is recognition that within-group differences in an attribute matter above and beyond its individual-level (e.g., LMX; Hooper & Martin, 2008) or mean-level effect (e.g., LMX mean; Yu et al., 2018). After decades of study plagued by a lack of concept clarity and imprecise theorizing and measurement in the group diversity field (Roberson, 2019), similar to the problems of the LMXD literature, Harrison and Klein (2007) offered more precise definitions, theories, and measurement of diversity, accelerating development of the group diversity literature. Here we suggest that the specific group dispersion perspective offered in Harrison and Klein's group diversity typology serves as a useful starting point for examining LMXD.

Harrison and Klein's (2007) Group Diversity Typology

Harrison and Klein (2007: 1200) defined group diversity as "the distribution of differences among the members of a unit with respect to a common attribute." Whereas early treatments of group diversity focused on the attributes of difference (e.g., job-related, deep-level, demographic; see Roberson, 2019), Harrison and Klein characterized group diversity in terms of both (1) the *attribute* on which members in a group vary and (2) the *shape* or distribution of differences on the attribute in a group. Based on these dimensions, the authors offered a typology, naming three distinguishable constructs: separation, variety, and disparity. Differences in perceptions, values, beliefs, or opinions reflect *separation*. Categorical

differences in knowledge, education, or competencies reflect *variety*, and differences in the concentration of valuable social or task-related assets and resources, such as status, decision-making power, or access to task-related information, indicate *disparity*.

Explicit and critical discernment of separation, variety, and disparity has not been undertaken in the LMXD literature, though common descriptions of the concept make implicit reference to these dispersion types. LMXD materializes in different shapes in groups (Martin et al., 2018) resulting from the formation of LMX relationships with varying levels of intimacy and trust, informed by several distinct source attributes (Erdogan & Bauer, 2010), which carry different meanings. Studies of LMXD have variously emphasized its distinct aspects and implications. Some studies describe LMXD in terms of differences in overall relationship quality and trust (i.e., *separation*; Guan et al., 2013); others emphasize differential status, autonomy, and access to task-relevant information (i.e., *disparity*; Boies & Howell, 2006); and some suggest that LMXD reflects members' unique roles, contributions, capabilities, or knowledge (i.e., *variety*; Lee & Chae, 2017). Similar to Harrison and Klein (2007), we characterize LMXD in terms of both source attribute (i.e., the meaning that LMX differences have in a group, referred to as "meaning") and distribution shape (i.e., the pattern of LMX differences in a group, referred to as "shape"), mindful of each construct's role in understanding LMXD's impact on group outcomes.

Separation, variety, and disparity suggest fundamentally different interactions among group members and rely on different theoretical explanations for effects on group outcomes. Furthermore, each construct requires distinct measurement. Ideally, studies will precisely characterize the anticipated meaning and shape of dispersion in groups (e.g., separation, variety, or disparity), then align theories, expected outcomes, and measurements accordingly. In furtherance of that ideal, we use key insights from Harrison and Klein's (2007) group diversity typology to offer a guiding framework clarifying the three LMXD constructs (Table 1).

A Framework of LMX Differentiation Constructs

Separation, the composition of differences in "position or opinion among unit members, primarily of value, belief, or attitude" (Harrison & Klein, 2007: 1203), captures dissimilarity or disagreement among members in a group. When LMXD denotes separation (*LMX separation*), there is disagreement among group members, based on divergent perceptions, opinions, or beliefs with respect to LMX (Figure 1). Note that separation is consistent with a key tenet of the original VDL (Dansereau et al., 1975) and LMX theories (Graen & Uhl-Bien, 1995)—namely, the separation of high- and low-LMX members into an in-group or out-group. This meaning is reflected in separation's shape. LMX separation is at its maximum when there are two equally large subgroups at the two endpoints of the LMX continuum: one group with high, the other with low LMX quality relationships. LMX separation is at its minimum when all members share similar perceptions of LMX quality.

Variety, the composition of differences in "kind, source, or category of relevant knowledge or experience among unit members" (Harrison & Klein, 2007: 1203), stresses the uniqueness of members. LMXD as variety (*LMX variety*) thus means distinctiveness of LMX relationships, which reflect members' unique knowledge, expertise, roles, capabilities, or contributions. Maximum LMX variety is realized when all group members offer unique contributions as seen in distinct relationships with their leader. When all leader-member

Table 1
Framework of LMX Differentiation Constructs, Theories, Predicted Group Outcomes, and Measurements

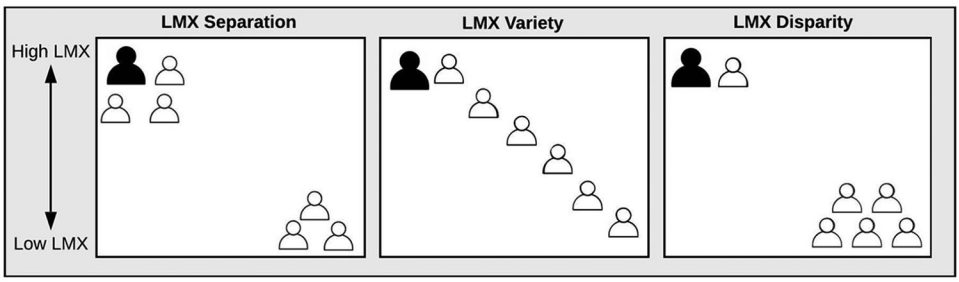
Theoretical Rationale	Predicted Group Outcome[b]	Measurement
LMX Separation: Dispersion in LMX relationships within a group as disagreement or opposition regarding an opinion or position.		
– Similarity-attraction[a]; attraction, selection, and attrition[a] – Social identity[a]; social, self-categorization[a] – Balance theory – Shared reality	– Morale, cohesion[a] (−) – Trust[a] (−) – Relationship conflict[a] (+) – Social and behavioral integration[a] (−) – Withdrawal[a] (+) – Task performance[a] (−)	– Average deviation (AD) – Standard deviation (SD)[a]; SD_N; variance (Var) – Mean Euclidean distance (MED)[a]; MED_N – $r_{WG(J)}$; $r^*_{WG(J)}$; $a_{WG(J)}$ – Direct measure of LMX separation
LMX Variety: Dispersion in LMX relationships within a group as distinctiveness in kind, source, or category.		
– Information processing[a] – Requisite variety[a]; variation, selection, and retention[a] – Human and social capital[a] – Role theory – Role clarity/ambiguity – Role system theory; role differentiation	– Coordination (+) – Task conflict[a] (+) – Creativity, innovation[a] (+) – Decision quality[a] (+) – (Complex) task performance[a] (+)	– Blau's Index[a] (Blau); $Blau_N$; Index of Quality Variation (IQV)[a] – Teachman's (Entropy) Index (TI)[a]; TI_N – Direct measure of LMX variety
LMX Disparity: Dispersion in LMX relationships within a group as inequality in concentration of valued social assets or resources.		
– Social stratification[a] – Status and power hierarchy[a] – Social comparison – Tournament[a] – Distributive injustice and inequity[a]; inequality; relative deprivation[a] – Group-value model of procedural justice	– Justice climate (−) – (Quality of) communication[a] (−) – Member input[a] (−), silence[a] (+) – Within-group competition (+) – Interpersonal undermining[a] (+) – Resentful deviance[a] (+) – Withdrawal[a] (+)	– Coefficient of Variation (CV)[a]; CV_N – Gini Coefficient (Gini)[a]; $Gini_N$ – Social network centralization – Direct measure of LMX disparity

a. Referred to in Harrison and Klein's (2007) typology.
b. −/+ = negative/positive association of LMXD construct with predicted group outcome.

relationships are the same, not affected by member' distinctive contributions to the group, LMX variety is at its minimum.

Disparity denotes the composition of differences in "proportion of socially valued assets or resources held among unit members" (Harrison & Klein, 2007: 1203), indicating that these assets or resources are unequally distributed. LMXD as disparity (*LMX disparity*) reflects inequality with respect to LMX, indicative of valued social assets or resources such as status, attention from the leader, and access to opportunities. In highly disparate groups, leaders invest in and form high LMX relationships with one or very few group members, distancing themselves via low LMX with all others. This meaning is reflected in disparity's

Figure 1
Pictorial Representations of the Three LMX Differentiation Constructs



Note: ▲ = leader; △ = group member. Each figure illustrates the distribution of LMX relationships within groups at maximum level of LMX separation, LMX variety, and LMX disparity, respectively. High (low) LMX indicates a group member's high- (low-)quality LMX relationship with the leader.

asymmetric shape: A large relative proportion of LMX quality is held by only one or very few group members. Alternatively, when there is no LMX disparity, all group members share equal LMX relationships with their leader.

Highlighting the various meanings and shapes of LMXD extends our understanding beyond a simplistic estimate of the degree of dispersion in groups. Consider a group where each member has formed a unique relationship with the leader based on his or her distinct role or expertise. While this arrangement would indicate a maximum degree of LMX variety, the same distribution would suggest a moderate degree of separation and disparity. Similarly, a maximally disparate group, where only one member has high LMX, could suggest that LMXD is relatively small if it were examined as separation or variety (Figure 1). Likewise, a group with two equally large and maximally distant subgroups would suggest high LMX separation yet only moderate LMXD variety or disparity. As such, LMXD's *degree* is valid only when it is clear which dispersion construct is invoked. In the following section, we derive implications for the three LMXD constructs in terms of theory application, outcomes, and measurement.

LMX Separation

Theories. Theories such as similarity-attraction, attraction-selection-attrition, social identity, social categorization, and self-categorization help to explain separation's negative outcomes for groups (Harrison & Klein, 2007). According to a similarity-attraction perspective, people prefer working with similar others (Byrne, 1971). Similar perceptions, beliefs, or positions regarding LMX among a group's members may increase attraction and engender subgroups of similarly minded people. An attraction, selection, and attrition-perspective (ASA; Schneider, Goldstein, & Smith, 1995) in groups holds that people are attracted to, selected into, and remain in groups with people similar to themselves. Differing positions in terms of LMX may decrease attraction and reduce the willingness to remain in the group. According to social categorization and social identity reasoning (Tajfel & Turner, 1986; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987), people group themselves and others according to salient categories. Self-concept is partly derived from perceived membership in relevant

social groups and their distinctiveness from out-groups. In groups with wide disagreement regarding LMX, members are likely to categorize themselves and others with similar perceptions regarding LMX into a favored in-group while those with dissimilar perceptions are categorized as out-group (and often discriminated against).

In addition, balance theory (Heider, 1958) and shared reality theory (Hardin & Higgins, 1996) offer valuable insights into LMX separation's effects on groups. Balance theory suggests that members of groups need balanced relationships with one another to feel comfortable. When there is LMX separation in a group, the imbalance in LMX should negatively impact group members' attitudes and behaviors. Similarly, according to shared reality theory, when a shared reality is achieved through the process of social verification, this fosters and regulates social interaction. Subgrouping as apparent in LMX separation may thus impair social interaction.

Group outcomes. Researchers draw on the outlined theories to argue that groups "whose members differ markedly on a continuum will experience low cohesion, high conflict, high rates of withdrawal, and poor performance" (Harrison & Klein, 2007: 1204). Given theoretical predictions of unfavorable social categorization, low attraction, and subgrouping, we thus expect that LMX separation is negative for groups as apparent in dysfunctional emergent states (e.g., relationship conflict, low cohesion and trust), impaired group processes (e.g., low social and behavioral integration), and low group effectiveness (e.g., withdrawal and low performance).

Measurement. Statistical dispersion indices, following a dispersion composition model (Chan, 1998), such as SD, Var, Average Deviation (AD), or Mean Euclidean Distance, determine the extent to which there are symmetrical differences in a group (Harrison & Klein, 2007). Consistent with LMX separation, these indices reach their maximum values when there is a bimodal distribution at or near the endpoints of a scale's continuum (e.g., at low and high LMX). In addition, statistical agreement indices such as $r_{WG(j)}$ are used to capture separation in terms of a lack of consensus (direct-consensus group composition model; Chan, 1998). As $r^*_{WG(j)}$ can become negative, it is better suited for assessing strong opposition (LeBreton & Senter, 2008) consistent with LMX separation than $r_{WG(j)}$, whose lower bound is constrained to 0 (disagreement), aside from inadmissible negative values. We provide formulas for these indices as well as a suitable alternative, $a_{WG(j)}$, in Table 2 and offer additional considerations on index choice in Appendix S5 of the online supplement.

Alternatively, researchers may determine LMX separation by averaging group members' direct assessment of LMXD in a referent-shift consensus model (Chan, 1998), using items such as "*Some* members of our group have high-quality relationships with the leader, whereas other members have low-quality relationships with the leader." An LMX measure underlying a separation index could assess broad beliefs, opinions, or perceptions of overall relationship quality.

LMX Variety

Theories. Requisite variety (Ashby, 1956) and variation, selection, and retention theories (e.g., Campbell, 1960) explain the importance of variety. Groups can use greater information richness for better choices, plans, or products (e.g., Harrison & Klein, 2007). From an information-processing perspective (e.g., Hinsz, Tindale, & Vollrath, 1997), groups are

Table 2
Formulas of Statistical Indices to Assess LMX Differentiation Constructs

Statistical Index	Formula	Available Correction for Varying Group Sizes	Assumed Scale of Measurement
LMX Separation			
Average Deviation[a]	$AD_{M(J)} = \frac{\sum_{j=1}^{J} AD_{M(j)}}{J}$	—	Interval
Standard Deviation	$SD = \sqrt{\frac{\Sigma(X_i - \bar{X})^2}{N}}$	$SD_N = \sqrt{\frac{\Sigma(X_i - \bar{X})^2}{q}}$	Interval
Variance	$\sigma^2 = \frac{\Sigma(X_i - \bar{X})^2}{N}$	$\sigma_N^2 = \frac{\Sigma(X_i - \bar{X})^2}{q}$	Interval
Mean Euclidean Distance	$MED = \frac{\sum_{i=1}^{N} \sqrt{\frac{\sum_{j=1}^{N} (X_i - X_j)^2}{N}}}{N}$	$MED_N = \frac{\sum_{i=1}^{N} \frac{\sum_{j=1}^{N} \sqrt{(X_i - X_j)^2}}{N-1}}{N}$	Interval
$r_{WG(J)}$[a]	$r_{WG(J)} = \frac{J\left(1 - \frac{\bar{S}_{X_j}^2}{\sigma_E^2}\right)}{J\left(1 - \frac{\bar{S}_{X_j}^2}{\sigma_E^2}\right) + \left(\frac{\bar{S}_{X_j}^2}{\sigma_E^2}\right)}$	—	Interval
$r^*_{WG(J)}$[a]	$r^*_{WG(J)} = 1 - \frac{\bar{S}_{X_j}^2}{\sigma_E^2}$	—	Interval
$a_{WG(J)}$[a]	$a_{WG(J)} = \frac{\sum_{j=1}^{J} a_{WG(j)}}{J}$	—	Interval

(continued)

Table 2 (continued)

Statistical Index	Formula	Available Correction for Varying Group Sizes	Assumed Scale of Measurement
LMX Variety			
Blau's Index	$Blau = 1 - \sum_{i=1}^{k} p_i^2$	$Blau_N = 1 - \sum \frac{N_i(N_i - 1)}{N(N-1)}$	Nominal
Index of Quality Variation[b]	$IQV = \frac{1 - \sum_{i=1}^{k} p_i^2}{Max}$	—	Nominal
Teachman's Index	$TI = -\sum \left[p_i * \ln(p_i) \right]$	$TI_N = TI * \left(\frac{N}{N-1} \right)$	Nominal
LMX Disparity			
Coefficient of Variation	$CV = \frac{SD}{\bar{X}}$	$CV_N = \frac{SD_N}{\bar{X}}$	Ratio
Gini Coefficient	$Gini = \frac{\sum_{i=1}^{N} \sum_{j=1}^{N} \lvert X_i - X_j \rvert}{2N^2 \bar{X}}$	$Gini_N = \frac{\sum_{i=1}^{N} \sum_{j=1}^{N} \lvert X_i - X_j \rvert}{2N\bar{X}(N-1)}$	Ratio
Social Network Centralization[c]	$C_X = \frac{\sum_{i=1}^{n} \left[C_X(p^*) - C_X(p_i) \right]}{\max \sum_{i=1}^{n} \left[C_X(p^*) - C_X(p_i) \right]}$	—	Interval

Note: AD can also be calculated around the median (AD_{Md}). J = essentially parallel items. $\bar{X}$ = mean. N = group size. q = unbiased estimator of group size (see Biemann & Kearney, 2010). X_i = value of subject i, X_j = value of subject j. $\bar{S}^2_{X_j}$ = mean of the observed variances for j essentially parallel items. σ^2_E = variance expected when there is complete lack of agreement. i = number of categories. p_i = proportion of category i in a group. Max = theoretical maximum. n = number of points. $C_X(p_i)$ = any centrality score of point i. $C_X(p^*)$ = largest value of $C_X(p_i)$ for any point in the network. $\max \sum_{i=1}^{n} \left[C_X(p^*) - C_X(p_i) \right]$ = the maximum possible sum of differences in point centrality for a graph of n points. Formulas from Biemann & Kearney, 2010 if not indicated otherwise. [a] Formula from LeBreton & Senter, 2008. [b] Formula from Harrison & Klein, 2007. [c] Formula from Freeman, 1978.

adaptive information processors in which distinct information, ideas, and cognitive processes are shared to inform the decision-making process response. LMX variety emphasizes distinctiveness by the unique relationships formed along the members' expertise, ideas, capabilities, and cognitive processes, which may benefit the group's information processing. A human and social capital view (Adler & Kwon, 2002; Becker, 1964) also suggests that LMX variety benefits groups. Unique relationships may help members to contribute to group performance based on their unique knowledge, skills, and abilities (human capital) and their unique networks, relationships, values, shared norms, and identities (social capital).

In addition, theories related to role and resource allocations reflective of group members' unique strengths, perspectives, and knowledge provide arguments for the advantages of LMX variety. According to role theory (e.g., Biddle, 1979), individuals hold beliefs for themselves and others based on social position and perform patterned behaviors in line with these roles. LMX variety may promote role-based behavior in groups because it clarifies role-based distinctions among group members. In line with role clarity-ambiguity arguments (e.g., Rizzo, House, & Lirtzman, 1970), the extent to which individuals have a clear understanding of tasks, duties, expectations, and goals related to their work roles matters for effective functioning. Role differentiation theory (e.g., Lewis, 1972) further suggests that an individual's role-related knowledge diminishes the likelihood that another role is adopted by that same individual. Effective functioning of groups and organizations relies on the coordination and culmination of individual work roles (role system theory; Katz & Kahn, 1978). Distinguishing members through LMX variety inhibits role ambiguity or overlap and encourages role coordination.

Group outcomes. Theories used to explain the positive effects of variety on groups tend to focus on the availability of distinctive sources of information and their use (Harrison & Klein, 2007). LMX variety is realized, in part, by a leader's intentional effort to customize investments and interactions with members based on their individual needs, motivations, skills, contributions, and preferences. Accordingly, LMX variety is expected to benefit group processes such as coordination, emergent states such as healthy task conflict, and group effectiveness outcomes such as decision quality, creativity, and performance as it leverages group members' unique roles, contributions, and capabilities (e.g., Lee & Chae, 2017).

Measurement. Consistent with LMX variety, Teachman's (1980) Index and Blau's (1977) Index capture the degree to which there are qualitative (categorical) differences in a group (Harrison & Klein, 2007). They are highest when an equal number of members are in each category (e.g., at each scale anchor of the LMX measure). For a description of using continuous measures in a categorical fashion, see Appendix S5 in the online supplement.

To assess LMX variety directly, items could estimate the extent to which group members have unique relationships with a leader, consistent with each member's role in or contributions to the group (e.g., "Each member of our group has a unique working relationship with our leader based on his or her contribution"). Items underlying an LMX variety index could estimate the extent to which relationships reflect the roles, needs, knowledge, preferences, or contributions of group members (e.g., "My working relationship with the leader of this group fits my role" or "My working relationship with the leader of this group meets my preferences").

LMX Disparity

Theories. A rich basis of theories, including social stratification, status hierarchies, social comparison, justice and relative deprivation theories, and tournament theory, project the pitfalls associated with disparity (Harrison & Klein, 2007). Social stratification (Grusky, 1994) results from the social standing ascribed to certain characteristics. LMX disparity reflects unequal social standing (Nishii & Mayer, 2009), inducing stratification. In line with status hierarchy arguments (Blau, 1964), social status, the amount of respect and acceptance by others, shapes hierarchy in groups. Social status is based on information about group members' competence or expertise as inferred from a stereotype, reputation, or direct, observed interpersonal interaction. LMX disparity offers a basis for differential status attributions and pertinent status hierarchies as it entails high-quality relationships with a select few and low-quality relationships with the rest (e.g., Herdman, Yang, & Arthur, 2017). Social comparison theory (e.g., Festinger, 1954) clarifies how group members infer their status. In the absence of objective information, people appraise and evaluate their abilities and opinions using social comparison. LMX disparity offers comparison-relevant information as it means inequality among the group members (that may be attributed to differences in ability and status). According to tournament theory (e.g., Lazear & Rosen, 1981), people expend more effort when reward structures rely on relative rank rather than absolute levels of output. LMX disparity, by the relative rank it induces, is likely to increase competition.

LMX disparity may also instigate justice concerns in groups. Based on equity-distributive injustice or relative deprivation arguments (e.g., Adams, 1965; Deutsch, 1985), individuals feel treated inequitably and experience relative deprivation when perceiving their input/outcome ratio as less favorable than those of relevant others (e.g., group members), such as in groups with LMX disparity. It may further induce procedural injustice perceptions in groups (group-value model of procedural justice; Lind & Tyler, 1988). As people value their membership in social groups, they are concerned with three group-value issues: the neutrality of the decision-making procedure, trust in the third party such as the group leader, and their social standing in the group. Unequal treatment by the leader, as indicated by LMX disparity, may activate these concerns.

Group outcomes. As suggested above, LMX disparity is negative for groups. A disproportionate concentration of status or task-related resources engenders social stratification and comparative tension among group members (Harrison & Klein, 2007), entailing negative group processes such as competition, undermining, conformity, and silence; emergent states such as climate of injustice; and lowered group effectiveness such as withdrawal and poor performance (e.g., Greer, de Jong, Schouten, & Dannals, 2018). Indeed, feelings of inequity and injustice in groups characterized by disparity might incite "competition, differentiation, and (resentful) deviance among some unit members" (Harrison & Klein, 2007: 1206).

Measurement. Disparity indices capture both within-group distances in the underlying attribute and the relative proportion of those with higher amount of the attribute (Harrison & Klein, 2007). Aside from the Gini (1921) coefficient, the coefficient of variation (CV; Allison, 1978), which is the SD divided by the mean, is a suitable index as differences on an attribute matter more when the attribute's mean level in a group is low (Sørensen, 2002). This means the index is asymmetric in that it matters that the minority is at the upper bound

and not at the lower bound. More distance between the majority at the lower bound and the privileged minority at the upper bound increases the CV. The maximum is reached when one member has the highest possible standing (i.e., high-quality LMX) and all other members have the lowest possible standing (i.e., low-quality LMX). Alternatively, a network centralization index (Burt, 1997) is suited to capture LMX disparity as it determines the degree to which social relations (e.g., LMX) are concentrated in one or few actors rather than equally distributed in a social network.

A direct measure (i.e., perceived LMX disparity) would assess LMXD as differences in valued resources and assets that are asymmetrically distributed in the group (e.g., "The leader of this group attends to *only one or a few* members of this group whereas he or she does not pay attention to the rest of the group"). Items underlying an LMX disparity index could assess the extent to which LMX reflects each member's status, resources, or influence (e.g., "The working relationship with the leader of this group indicates my standing in the group").

Method

We conducted a systematic review of the existing body of research on LMXD and group outcomes using our proposed framework. It is not our intention to critique the extant literature. Rather, we seek to gain an understanding of the degree and nature of alignment of LMXD study characteristics, which can be made apparent by applying insights derived from the group diversity literature. Given that misalignment between concept and measurement is an important source of ambiguity and inconclusiveness (e.g., Shaw, 2017), we seek to identify opportunities for further development of the field.

Literature Search

We performed a comprehensive search of the Web of Science, PsycINFO, and EBSCO Business Source Premier databases for peer-reviewed journal articles on LMXD published through August 2019, including keywords (LMX or leader-member exchange) in the title or abstract such as "LMX differentiation," "LMX dispersion," "LMX consensus," and "LMX variability." We also searched for all in-press articles in top management and applied psychology journals (*Journal of Management*, *Academy of Management Journal*, *Journal of Applied Psychology*, *Journal of Organizational Behavior*, *Personnel Psychology*, and *The Leadership Quarterly*) and reviewed the reference lists of recent LMXD reviews (e.g., Yu et al., 2018). Our search yielded 1,845 unique articles, most of which did not measure LMX. We examined the full texts of 69 remaining articles to determine if they met our criteria for inclusion. To be included in our final database (31 articles see Appendix S1 of the online supplement), an article had to (a) be empirical and quantitative, (b) measure some form of LMXD, and (c) hypothesize LMXD's relationship with a group outcome.

Coding Procedure

Two authors coded each article in our database for study characteristics including conceptual definition(s), theory application, outcome, and measurement as reflective of separation, variety, or disparity, or some combination of the three (Cohen's kappa $k = .83$; disagreements were discussed and resolved among all authors). First, studies varied in their description of LMXD, some describing the concept as reflecting broad perceptions of overall relationship

quality (LMX *separation*; e.g., Zhao, 2015), while other studies specifically characterizing LMXD as reflecting differential abilities, contributions, and roles of members (LMX *variety*; e.g., Lee & Chae, 2017) or status, favoritism, or resource inequality (LMX *disparity*; e.g., Boies & Howell, 2006). Table 3 provides examples of how descriptions were coded. When provided, we recorded information about LMXD's shape, coding the studies as invoking separation, variety, disparity, or some combination of the three.

Second, if a study offered a theoretical explanation for LMXD effects on groups, we coded the theory (or theories) as reflective of separation, variety, and disparity. Third, we coded group outcomes for articles that hypothesized main effects of LMXD based on one of three outcome types: emergent states, group processes, and group effectiveness (Yu et al., 2018). Whereas *group processes* denote a group's goal-directed activity (e.g., information sharing), *emergent states* are a group's cognitive and affective states accompanying this activity (e.g., conflict). *Group effectiveness* was defined broadly as products, outputs, and results of member interaction (e.g., group performance, group creativity, group innovation, group-level attitudes such as satisfaction, [low] group-level withdrawal; Cohen & Bailey, 1997; Mathieu, Gallagher, Domingo, & Klock, 2019; Mathieu & Gilson, 2012). We then coded group outcomes as reflective of the LMXD constructs.

Finally, when reported, we coded the measure of LMX employed in each study (e.g., LMX-7, Graen & Uhl-Bien, 1995), along with the statistical index used to estimate differentiation (e.g., SD) or, alternatively, a perceived LMXD measure (e.g., Mayer, Erdogan, & Piccolo, 2008). In addition, we coded whether and how the choice of index was explained. Some studies offered a theoretically or empirically relevant explanation of index choice (e.g., Seo, Nahrgang, Carter, & Hom, 2018), whereas choices in other studies appeared to rely on convention or convenience.

While coding study characteristics, we were attentive to articles that invoked multiple LMXD constructs. Chen, He, and Weng (2018), for example, offered an extended description of LMXD, referring to separation ("different types of exchange relationships with their followers . . . by treating some followers more favorably than others"; p. 947), variety ("LMX differentiation is based on followers' ability, competence, task performance, or general contributions to the organization"; p. 947), *and* disparity (LMXD is a "relational output . . . [and can create tension] . . . as a result of the *unfair* distribution of resources"; p. 951).

Results

An essential purpose of this review was to estimate alignment between descriptions, theories, group outcomes, and measurements in the LMXD literature. We reviewed each study to identify which LMXD constructs were revealed in descriptions of the meaning and shape of the distribution of LMX relationships in a group. Then, by relying on our framework, we estimated the extent to which the theories, group outcomes, and measurements in a study aligned with the described LMXD construct. Misalignment among a study's fundamental design characteristics can lead to logical inconsistencies, inaccurate inferences, and misinterpretation of results (Krasikova & LeBreton, 2012). We first report on the results per coded category before describing alignment between these categories. Results are summarized in Table 4. A complete inventory of our assessment can be found in Table S2 of the online supplement.

We examined the extent to which the three constructs are reflected in *descriptions* of LMXD. Forty-eight percent (48%) of the articles described LMXD as indicative of

Table 3
Sample Descriptions of LMX Differentiation as Categorized by LMX Differentiation Construct

Construct	Example Descriptions of LMX Differentiation
LMX Separation	– ". . . level of dispersion, or *differentiation*, in the quality of LMX relationships experienced by employees" (Nishii & Mayer, 2009: 1413) – ". . . LMX differentiation tends to introduce *relational boundaries* into teams, which in turn divide team members and facilitate ingroup and outgroup formation" (Li & Liao, 2014: 850) – ". . . LMX differentiation can lead to in-group and out-group perceptions between work group members in similarly high- and low-quality LMX relationships" (Stewart & Johnson, 2009: 511) – "The quality of these relationships exists on a continuum from high to low with the end points indicative of the supervisor's inner circle and the fringe of the workgroup, respectively" (Haynie, Cullen, Lester, Winter, & Svyantek, 2014: 912)
LMX Variety	– ". . . differentiating . . . [to] find the best fit between members' abilities and their task assignments . . . and allocate scarce resources to members in line with their abilities, skills, and contributions" (Seo et al., 2018: 479) – ". . . LMX differentiation is a division of labor that occurs as the result of role differentiation during the formation of LMX relationships" (Liden et al., 2006: 726) – ". . . group leaders . . . optimize their utilization of human resources . . . by assigning different roles [dependent on member capabilities]" (Lee & Chae, 2017: 107) – ". . . [LMXD] is functional for the group because a leader should assign appropriate tasks and resources to followers who differ in their ability . . . competence, task performance, or general contributions" (Chen et al., 2018: 947)
LMX Disparity	– ". . . differentiation can be interpreted as an indicator of a member's status within a group" (Liden et al., 2006: 726) – ". . . LMX differentiation establishes a social hierarchy within a team, where members gain different levels of status and trust granted by team leaders" (Liu, Hernandez, & Wang, 2014: 808) – ". . . the leader develops a high-quality relationship with one or a few followers while maintaining low or moderate levels of relationships with other members" (Seo et al., 2018: 480) – ". . . high LMX employees would gain access to greater opportunities and individualized consideration" (Ford & Seers, 2006: 260)

separation only and 16% of disparity only. Nineteen percent (19%) invoked both separation and disparity, 7% variety and disparity, and 10% of LMXD descriptions touched on all three constructs. One article described LMX but not LMXD. Though we tried to infer constructs from descriptions of LMXD's shape, with a few notable exceptions (Herdman et al., 2017; Li & Liao, 2014; Seo et al., 2018), insufficient information was provided in the primary studies to do so.

Theories utilized to explain the influence of LMXD on group outcomes vary greatly, representing 28 unique theories among the 31 articles. The most frequently used theories were justice and equity theories (24%), social comparison (10%), and role theory (9%). Several theories were only used one time in our dataset (e.g., shared reality, tournament theory).

We mapped the frequency with which theories consistent with separation, variety, or disparity were applied to LMXD. Thirty-two percent (32%) of studies in our database employed a theory that was solely reflective of disparity, 19% solely reflective of separation, and 6%

Table 4
Representation and Alignment of the Three LMX Differentiation Constructs With Respect to Study Characteristics

	LMX Differentiation Construct					
Construct	Separation	Variety	Disparity	Multiple	None	Alignment
Description	77%	17%	52%	36%	0%	
Theory	42%	29%	62%	33%	10%	
Outcome[a]	75%	30%	35%	35%	0%	
Measure[b]	97%	0%	0%	0%	3%	
Index[c]	94%	0%	0%	0%	6%	
Description = theory						29%
Description = outcome[a]						29%
Theory = outcome[a]						29%
Measure = index						90%
Description = measure = index						45%
Theory = measure = index						16%
Outcome = measure = index[a]						35%
Description = theory = outcome = measure = index[d]						10%

Note: Study $N = 31$. The percentages represent the proportion of articles in which the constructs appear and at times sum to more than 100% when multiple constructs were invoked.
a. Study $N = 20$ for group outcomes, because outcomes associated with moderation hypotheses were not coded.
b. None was coded for one article that did not contain information about the measure used.
c. None was coded for two articles in which no statistical LMX differentiation index was employed (because either a perceived LMX differentiation measure was used or range was employed which only captures the distance of the highest and lowest LMX value in a group, not the shape of LMX relationships in a group).
d. Any combination of constructs beyond those represented in the table provides an alignment percentage score of 10%.

solely reflective of variety. One study invoked theories consistent with separation and variety, three studies (10%) reflected separation and disparity, and three studies were indicative of variety and disparity. Three studies made theoretical predictions linked to all three constructs.

Group outcomes hypothesized to relate to LMXD in the reviewed primary studies are group performance (19%), group conflict and cohesion (19%), group innovation and creativity (9%), group justice perceptions (16%), and other forms of group climate (26%). Most outcomes (52%) were emergent states, 28% reflected group effectiveness, and 20% were group processes.

We determined frequencies based on our coding of predicted group outcomes as reflective of separation, variety, or disparity. Forty percent (40%) of reviewed studies predicted outcomes solely reflective of separation, 15% solely reflective of variety, and 10% solely reflective of disparity. Twenty percent of studies predicted group outcomes reflecting separation and disparity, 10% invoked group outcome predictions consistent with separation and variety, and 5% suggested all three constructs by the predicted group outcomes. Of the articles predicting emergent states, half were consistent with separation and half were consistent with disparity. In studies of group processes, 78% were indicative of separation, 11% of variety,

and 11% of disparity. Group effectiveness predictions were negative in 64% of studies, consistent with separation, and positive in 36% of studies, consistent with variety.

Our review shows consensus in *measures* and *statistical indices* used to assess LMXD. Ninety-four percent (94%) of articles used and reported on the underlying LMX measure. The LMX-7 by Graen and Uhl-Bien (1995) was used in 39% of these studies, the multidimensional measure by Liden and Maslyn (1998; LMX-MDM) in 19%, the Scandura and Graen (1984) LMX-7 measure in 19%, and the Chinese LMX-7 (Hui, Law, & Chen, 1999) in 10% of these studies. Three articles (10%) utilized different LMX measures (adapted LMX-7 by Liden, Wayne, & Stilwell, 1993; LMX-13 by Settoon, Bennett, & Liden, 1996; LMX-SLX by Graen, Hui, & Taylor, 2004). As revealed in items such as "My supervisor is the kind of person one would like to have as a friend" (LMX-MDM) or "I have an effective working relationship with my supervisor" (LMX-7; Graen & Uhl-Bien, 1995), these measures assess perceptions, opinions, or beliefs regarding overall relationship quality with the leader, reflecting separation.

One article measured perceived LMXD (Mayer et al., 2008), which included items consistent with both separation (e.g., "The team leader has high quality working relationships with some employees, but low quality working relationships with other employees") and disparity in terms of meaning (e.g., "The team leader prefers some employees more than others") and shape ("The team leader tends to only develop high quality working relationships with a few trusted employees, while other employees have low quality working relationships").

Statistical indices in our sample include SD (43%), Var (43%), r_{wg} (8%), AD (3%), and range (3%). All but two studies used indices indicative of separation (94%): One used range, which does not sufficiently characterize the distribution of scores reflected in dispersion constructs; the other used scale mean on a perceptual measure rather than an index of dispersion. Nine studies (30%) explained index choice: Four offered empirically or theoretically derived justifications consistent with the construct; five relied solely on prior research.

Based on our coding of the LMXD construct reflected in each article's description, theory, predicted group outcome, and measurement, we estimated the alignment of study characteristics for each article in the dataset (Table 4). Ensuring alignment is relevant, as misaligned study characteristics compromise and potentially invalidate conclusions drawn from a study (Krasikova & LeBreton, 2012). Study characteristics are aligned when the same construct is reflected in construct description, theory application, predicted outcomes, and measurement.

Descriptions and *theories* of LMXD were aligned in 29% of the studies in our dataset. Likewise, *description* and *group outcomes* were aligned in 29% of the studies, as were constructs suggested in *theory* and *group outcomes*. *Descriptions* and *group outcomes* more frequently reflected separation than disparity or variety, whereas *theories* more frequently suggested disparity than separation or variety. The constructs suggested in *description* and *measurement* were aligned in 45% of the articles (we considered *measure* and *index* conjointly given their almost perfect alignment along separation). *Theory* and *measurement* were aligned in 16% of the studies. Articles employed *theories* suggesting disparity twice as frequently as separation, whereas *measurement* almost always suggested separation. *Group outcomes* and *measurement* were consistent in the LMXD construct in 35% of the studies.

Two articles (10%) showed full alignment with respect to the LMXD construct suggested across categories: Schyns (2006) and Zhao (2015) conceptualized LMXD as separation and offered aligned theory, outcomes, and measurement. As an example, Schyns (2006) described LMXD as differences in relationship quality and used balance theory to predict negative

outcomes for groups. Without balance in relationship quality, Schyns (2006) predicted lower performance of groups high on LMXD (or low on consensus). Schyns calculated the SD of responses on LMX, capturing the level of separation of attitudes, beliefs, and perceptions.

Discussion

Studies of LMXD have invoked various, often conflicting, theoretical frameworks and yielded inconsistent results on group-level outcomes. In this review, we attempt to bridge perspectives from the group diversity literature with LMXD (Short, 2009) by drawing on insights from Harrison and Klein's (2007) typology of group diversity constructs. Doing so allowed us to broaden and clarify the LMXD construct domain, extend and complement previous reviews of the LMXD literature (e.g., Henderson et al., 2009; Martin et al., 2018; Yu et al., 2018), and estimate alignment among study characteristics in the existing body of research.

Our comprehensive review revealed that most studies of LMXD rely on a traditional, simplistic view of the construct—differentiation in overall relationship quality. Such a view underspecifies the complexity of LMXD in groups, leaving applications of theory and choices about measurement both deficient and subject to chance. Consequently, the existing LMXD literature relies on a limited set of measures and statistical indices reflective exclusively of separation. Though disparity and variety, for example, were inferred in 52% and 17% of the studies, respectively, as apparent in how LMXD was specifically described, no studies explicitly measured those constructs. Choices of measures and indices were rarely explained in primary studies and too often misrepresented the underlying group dispersion construct of interest.

Through a group diversity lens, we developed a multifaceted framework that allowed us to identify and address limitations in the LMXD literature beyond that of previous reviews (e.g., Martin et al., 2018; Yu et al., 2018). Our framework allowed us to make a substantive, objective evaluation of the literature by providing criteria through which to inventory studies and compare alignment within and between primary studies. In the following section, we offer recommendations for enhancing construct clarity, measurement choice, and alignment of constructs, theories, and measurement as revealed by our review and based on our guiding framework. We then highlight opportunities for future research stimulated by our proposed framework. Additional recommendations are in the online supplement (Tables S3 and S4).

Applications of the Proposed Framework

Construct clarity. As our literature review reveals, LMXD has been conceptualized, theorized, and measured in manifold ways, absent precision or attention to the concept's complexity. Many existing studies employ broad and generic descriptions of the term "LMX differentiation" or use related terms (e.g., LMX consensus, Schyns, 2006; or LMX variance, Guan et al., 2013) without consideration of underlying sources of variation in leader-member relationships, or the distribution of relationships in a group. More precision and clarity in the LMXD concept broadens the construct domain, reduces the possibilities of erroneous inferences (Roberson et al., 2007), and allows for comparisons of results across studies.

Our framework introduces separation, variety, and disparity to the LMXD literature, which reflect different treatments of dispersion in groups and differ markedly in their core theoretical

predictions and measurements (Harrison & Klein, 2007). Though not explicitly, studies of LMXD refer to all three dispersion constructs (see Table 3 and Table S2 in the online supplement). Consistent with convention, LMXD is formally defined as separation in two-thirds of the studies in this review (e.g., "degree of variability in the quality of LMX relationships formed within work groups"; Liden et al., 2006: 723), due, in part, to VDL and early LMX theories' fundamental emphasis on in-groups versus out-groups, rather than intentional treatment of a particular arrangement of leader-member relationships. However, in studies that rely on such definitions and descriptions, separation can be inferred only by a "diagnosis of exclusion" or strict reliance on what is directly stated given no explicit reference to disparity or variety. As such, it is not clear whether in fact a researcher *means* differential perceptions or experiences regarding relationship quality (i.e., separation) or if this is the default interpretation given a conventional tenet in the mentioned theories' explication.

When LMXD is defined without precision, differences between LMXD types become blurred. Broad descriptions do not specify the shape or source of dispersion or what LMXD might mean in a given context (e.g., role or status differences). Separation and disparity, for example, both reflect the existence of conflicting subgroups, a phenomenon that is expected to produce negative group outcomes. If LMXD is defined broadly, nontrivial differences between these constructs will be neglected. Theories that explain the effects of separation, for example, tend to focus on the mechanisms and consequences of subgrouping (e.g., social categorization; Stewart & Johnson, 2009), whereas theories used to explain the effects of disparity focus more often on perceived injustice and status differentials (e.g., fairness; Nishii & Mayer, 2009).

To avoid the risk that LMX separation turns into a residual category in which LMXD remains largely unspecified, we recommend that researchers explicitly assign an accurate and specific label to the differentiation construct of interest (e.g., LMX separation, variety, or disparity), define and describe the construct in terms of its meaning and shape, and note, where relevant, conceptual and theoretical distinctions between the constructs (see Table S3). Doing so will offset inherent flaws in measuring leader-follower relational concepts in general (van Knippenberg & Sitkin, 2013) and LMX in particular (Gottfredson, Wright, & Heaphy, 2020).

Methodological choice. With a few rare exceptions (e.g., Chiniara & Bentein, 2018; Herdman et al., 2017; Seo et al., 2018; Sui et al., 2016), a study's implicit perspective on LMXD did not seem to guide measurement choices, which were often explained by convention, tradition, or practical concerns rather than the underlying, fundamental construct domain. Nearly all studies, for example, employed traditional measures and indices consistent with separation, even though about half of the studies inferred disparity and about one fifth inferred variety. This may reflect a lack of knowledge about substantive differences among statistical indices and measures or, more fundamentally, failure to appreciate LMXD in its various forms. It may also reflect limited exposure to suitable measurement alternatives. As such, our framework presents a portfolio of measurement options for valid and sufficient estimation of LMXD in groups (Tables 1 and 2) as well as additional guidance for index selection (Appendix S5 in the online supplement).

Proper measurement choice reduces the impact of empirical overlap among the dispersion constructs. Though we have illustrated conceptual distinctions between LMX separation, variety, and disparity and suggested empirical treatments of each, overlap among the

constructs exists. In group diversity research, separation is frequently assessed via SD, while disparity is most often measured using CV, a function of SD (SD divided by sample mean). Hence, effects of separation and disparity on group outcomes are correlated, and variance shared among indices is not random. At lower ends of their respective continua (e.g., low levels of LMXD), separation, disparity, and variety are mathematically indistinguishable, which limits their respective predictive utility.

A study by Roberson et al. (2007: 565) revealed differential effectiveness of various dispersion indices in detecting true relationships between group-level predictors and outcomes (i.e., Type I and Type II errors), concluding that dispersion indices "may yield different inferences regarding the relationship between within-group variance and group-level outcome variables." CV, for example, was less likely than SD, AD, or r_{WG} to detect interaction effects among a study's variables. Dispersion indices tend to be differentially sensitive to study characteristics such as group size, sample size, scale anchors, and variable type (e.g., nominal, interval, ratio), which limits the ability to compare and contrast results across samples and studies. The decision to rank one sample of leader-follower relationships as more differentiated than another, for example, has theoretical as well as methodological implications (Allison, 1978). Thus, despite empirical correspondence between statistical indices, measurement choices have practical implications for accurately detecting true relationships among variables and for generalizing conclusions beyond a single study.

We therefore recommend justifying measurement choice consistent with LMXD's conceptualization and advocate for the use of the appropriately sensitive indices of dispersion in groups, including those not common in the management literature. Drawing on the literatures in sociology, economics, finance, and population ecology, we suggest additional indices of dispersion that could strengthen construct-measurement alignment (e.g., measuring disparity with CV or an index of network centralization) and improve alignment with specific theories *within* an LMXD construct. For example, the Gini coefficient (Tables 1 and 2) may be appropriate when social comparison (Festinger, 1954) is the fundamental theoretical frame in a particular study, as it captures all absolute differences that exist among members of the same group. Aside from additional indices that allow for a more holistic view of LMXD, and estimate dispersion on more than one attribute and one scale level (e.g., proportion-of-variance-explained; Gadrich et al., 2015), we further suggest analytical alternatives (e.g., Qualitative Comparative Analysis; Misangyi et al., 2017) that broaden options for researchers and encourage tighter alignment between conceptualization, theory, and measurement (Gadrich et al., 2015). Details are presented in Appendix S5 of the online supplement.

Alignment. Applying our framework, we conclude that construct descriptions, theories, outcomes, and measurements in many existing studies of LMXD are not fully aligned. There may be several reasons for this. First, a lack of conceptual clarity gives rise to random variance in primary studies and leads to a wide range of possible interpretations (Shaw, 2017). Second, there is almost no variation in LMXD's measurement. Relying on tradition, convention, or convenience, nearly all studies used a narrow set of survey measures and indices reflecting separation. Third, theorizing has often been detached from LMXD's conceptualization. For instance, 10 studies exclusively employed logical and theoretical arguments consistent with disparity (most commonly, justice theories), though only five studies conceptualized LMXD as such. This, among other things (e.g., three studies

lacked discernable theorizing altogether), may explain low alignment among characteristics in studies of LMXD. Last, many studies invoked two or more constructs at the same time. About a third of the studies mix constructs in LMXD's description, theorizing, and predicted group outcomes. Hence, misalignment of theory, construct definition, and measurement remains a critical headwind on the advance of our understanding of LMXD.

To remove or reduce these sources of misalignment, we recommend the use of measurement, theorizing, and group outcomes consistent with one, and only one, LMXD construct (e.g., Tordera & González-Romá, 2013). Our framework introduces nuance in LMXD and enables recognition of when and how varied constructs are revealed. We catalog theories, group outcomes, and measurements consistent with each LMXD construct (Table 1), providing a practical guide to designing studies that align essential characteristics and offer the best chance to identify true relationships among variables of interest. While this recommendation highlights the importance of alignment *within* studies, we recognize that misalignment is evident *between* studies of LMXD that have invoked descriptions of varying levels of specificity, conflicting theoretical frameworks, and inconsistent measures, indices, and outcome predictions of the same LMXD construct. Similarly, misalignment *between* studies of LMXD occurs when the same theories, group outcome predictions, and measures or indices are applied to different LMXD constructs. Studies that explicitly invoke multiple LMXD constructs could provide interesting examinations of relative utility and interactions among constructs, though we recommend that researchers are clear and consistent in their treatment of the complexity that naturally emerges in studies of within-group dispersion.

Opportunities for Future Research

Our proposed framework allowed for examination of alignment among study characteristics and guided an introduction of new measurement options to the LMXD literature. In the following section, we describe caveats in the application of our multidimensional framework and briefly introduce new opportunities for future research derived from our proposed framework. Additional research ideas are in Table S4 in the online supplement.

Related theoretical perspectives. Our application of insights from Harrison and Klein's (2007) typology rests on a group composition perspective and the notion that LMX quality is an attribute on which group members vary. An alternative to this perspective, especially in terms of separation and disparity, is to view differentiation through a social network lens, which would regard LMX quality as an individual characteristic that shapes one's centrality or status in a social network (e.g., Klein, Lim, Saltz, & Mayer, 2004). High LMX quality, from this point-of-view, might reflect social currency with "status" value, especially when only one or very few group members obtain it. The scarcity of high LMX in disparate groups, therefore, might increase its significance as an indicator of status, which has implications for group composition and interaction (cf., van Knippenberg & Mell, 2016).

Invoking a social network lens fosters additional research possibilities about the distribution of LMX relationships in groups. LMX theory ascribes benefits, status, power, and centrality to those who enjoy high LMX quality with their leaders (e.g., Graen & Uhl-Bien, 1995) and consequences for those who do not. Whereas power and status differentials might be especially salient in groups with high levels of LMX disparity, those differences may be

irrelevant in groups with high levels of LMX variety and a uniform distribution of LMX quality. Further, whereas individuals with low LMX quality may experience isolation or minimalistic transactional exchange with a leader, when those same individuals are part of large disparate or separated subgroups, the risks of low LMX quality may be reduced. Future research could consider questions directly counter to original theorizing about LMX, testing, for example, the extent to which power is derived from association with out-groups (i.e., "underdogs"), especially in groups with high LMX separation or disparity.

LMX variety. Only rarely have LMXD scholars applied theories consistent with *variety* (for exceptions, see Table S2 in the online supplement), and in no study in our sample was LMXD measured as such, despite frequent referrals to the construct. This is especially problematic given that LMX variety is the only proposed LMXD construct that is expected to have positive effects on group outcomes, a central and persistent tenet of early VDL and LMX theories, and a common prediction in studies of LMXD (Dansereau et al., 1975; Graen, 1976; Liden et al., 2006). We see two likely reasons for infrequent pursuit of variety in studies of LMXD at the group level.

First, theoretical paradigms that support the benefits of variety (e.g., information processing, human and social capital) rely on an information decision-making perspective (van Dijk, van Engen, & van Knippenberg, 2012), which suggests that groups composed of individuals who are distinct in knowledge, information, and experience will be more successful than homogenous groups. Until now, LMX has rarely been conceptualized as a distinctive characteristic on which group members vary, leaving these particular paradigms largely overlooked. Related, studies of LMXD have often emphasized status differentials and hierarchies among group members, but in groups with high LMX variety—where relationship quality is equitably shaped by each member's uniqueness—status and power differentials are not immediately salient.

Second, LMX quality is a construct reflecting dyadic interchange between leaders and followers and is most often measured with a continuous variable. Variety in a group, however, tends to characterize differences among members on discrete categories (e.g., gender, race, education; Harrison & Klein, 2007). One could question, therefore, whether dyadic LMX relationships could be meaningfully assigned to distinct categories, a common practice in the group diversity literature. As existing measures of perceived LMXD focus exclusively on separation and disparity (e.g., Mayer et al., 2008), we advocate for a measure of perceived LMX variety. Optimally, such a measure would assess LMXD as a function of each member's contribution, role, or knowledge (e.g., "Each member of our group has a unique working relationship with our leader based on his or her contribution").

Alternatively, Loss-of-Similarity (LOS; Gadrich et al., 2015) is an index that could be used to assess LMX variety, one that is ideal when there is equally distributed nonsimilarity across group members. An index of LOS could estimate the extent to which unique LMX relationships exist in a group by determining the degree to which the actual distribution differs from the ideal. An enhanced measure of LMX quality would assess the fit of relationship quality as a function of each member's contribution, role, or knowledge (e.g., "My working relationship with the leader of this group fits my role") and underlie calculation of an LOS index.

Interrelations with group diversity. In developing our framework, we derived insights from Harrison and Klein's (2007) typology of group diversity constructs. In so doing, we

recognize several important similarities between group diversity and LMXD, including construct descriptions, parallel theorizing, and common measurements. We further recognize similarities in how the two fields have developed over time with a sense that the group diversity literature is at an advanced stage of development relative to LMXD (Roberson, 2019). However, it would be imprudent to apply a group diversity perspective without caution and care. There are several important, noteworthy differences between LMXD and group diversity and several opportunities to blend research in the two fields.

Studies of group diversity tend to focus on within-group variability in individual characteristics that are relatively stable, including demographic, job-related, or deep-level diversity attributes (e.g., van Knippenberg & Mell, 2016). In contrast, LMXD is the result of dyadic leader-follower interactions that are more malleable and portray status differentials between actors. Although both leader and follower shape the LMX relationship, the leader is seen as making the relationship offer (Graen, 2004; Graen & Uhl-Bien, 1995) and influencing a follower's return on investment in the relationship. As such, LMX relationships portray a hierarchy and status differential among actors that does not always exist in groups with diverse members. This illustrates a point of departure between group diversity and LMXD.

Another important distinction between group diversity and our LMXD framework is the conceptualization of separation, one of the three characteristic dispersion forms. In the group diversity literature, separation is defined as composition of "(lateral) differences" (Harrison & Klein, 2007: 1203), and hence, no hierarchy is suggested or implied between the subgroups that are formed by differences in perceptions, beliefs, or opinions (i.e., either end of the continuum of the variable of interest is equally valuable). In our framework, separation is consistent with core LMX theorizing that ascribes more access, centrality, opportunity, and so forth to the high- rather than the low-LMX subgroup. Ultimately, the in-group (those with high-quality LMX relationships) realizes more benefit than the out-group (those with low-quality LMX relationships), which is why current formulations of LMX theory explicitly prescribe that leaders make high-quality relationship offers to all members of a group (Nishii & Mayer, 2009). Although our LMXD framework draws on insights from group diversity constructs, it does so with recognition of both conceptual and empirical distinctions between the fields (e.g., nature of separation).

Given that group diversity and LMXD may be explicitly related, we see potential in the study of group diversity as an antecedent of LMXD. According to expectation states and status characteristics theory (Berger, Fisek, Norman, & Zelditch, 1977), for instance, status characteristics tend to be widely shared beliefs about the social significance, competence, and efficacy of particularly salient characteristics (e.g., higher age, male sex). Group members' participation, influence, and prestige vary as a function of status characteristics independent of any prior cultural belief in the value of those characteristics to the task. Differences in status characteristics in a group may stimulate LMX disparity such that those possessing valued status characteristics also come to have high LMX relationships. In other words, the meaning and shape of group diversity may predict the meaning and shape of LMXD.

Dynamic nature of LMXD. Our framework relies on a group composition perspective, which suggests that group membership evolves over time, altering the nature of interaction and quality of group functioning (Mathieu et al., 2019). The need to account for changes in LMX relationships has been recognized in recent LMXD reviews (e.g., Anand et al., 2015;

Martin et al., 2018). Consistent with these perspectives, we recommend the application of theories and methods to predict and examine the dynamic nature of LMX separation, variety, and disparity.

Studies of LMXD tend to treat the concept as static. When evolution in group-level differentiation is modeled, it is most often done so with respect to the *degree* of differentiation (e.g., more or less; Martin et al., 2018). Our framework provides an opportunity to examine shifts in LMXD in different ways, not just with respect to degree. In particular, our consideration of characteristic types with unique shapes and meanings enables more specific as well as novel theorizing about and examinations of LMXD. Are subgroups considered to be "in" or "out" based on the situation, context, or task assignment? Could those close to a leader in one situation be marginalized in another? An engineering team, for example, might experience little access to a firm's CEO during regular operations (i.e., low LMX; out-group) but find themselves getting more resources and attention (i.e., high LMX; in-group) during urgent moments of product or process innovation (i.e., subgroups can shift in LMX quality depending on the context). Future research could examine how LMXD evolves over time in terms of shape and meaning, not just degree.

Different LMXD types may occur in the same group, over time. One type of LMXD (e.g., separation) could evolve into another (e.g., disparity). For example, a group with a variety of LMX relationships based on different roles, contributions, and expertise could evolve into one with a high degree of disparity if one or very few members begin to outperform the rest. In such a group, LMX quality could shift among members fostering the formation of conflicting subgroups. Hence, it remains an area of further research whether patterns or sequences of transition crystallize when observing groups over time. Changes in group composition or external factors may precipitate such developments.

Our framework highlights LMXD in its various forms, noting that these forms are more clearly visible and discernible at their respective maximum levels. One alternative, potentially conflicting perspective is an ASA framework (Schneider et al., 1995), which, applied to group composition, suggests that members of groups become more similar over time. If this perspective were to be generalized to LMXD, would members of long-standing groups eventually all share similar LMX relationships with the leader (i.e., no differentiation)? If so, the three differentiation types would morph over time and their respective validities would diminish.

Assessing the dynamic nature of LMXD hinges on adequate study designs and measurements. Observing groups over time or experimentally manipulating the three LMXD constructs could be combined with repeated social network assessments to understand how the three constructs shape (and are shaped by) social network patterns in the group (e.g., in terms of communication, Sias & Jablin, 1995; see also Anand et al., 2015; Martin et al., 2018). These novel approaches would mark an important departure of the near exclusive reliance on survey-based research methods and static designs, enabling more fine-grained understanding of intervening mechanisms, temporal effects, and an estimation of cause-and-effect relationships.

Conclusion

In spite of the hearty accumulation of research on LMXD, the effects of LMXD on group outcomes remain inconsistent and uncertain. Informed by insights from the group diversity literature, we broaden LMXD's construct domain, recognizing that LMXD can take three different forms (LMX separation, variety, and disparity) based both on the source attribute or

meaning of differentiation and the distribution shape of leader-follower relationships in a group. We introduce a multidimensional framework that allows us to examine studies of LMXD from a fresh perspective, recommend enhancements to improve alignment of study characteristics, and identify new avenues for future research. Our review is aimed at reducing or removing avoidable causes of inconclusiveness in the literature and paves the way for more nuanced LMXD theorizing, research, and measurement.

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