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How perceptions of others' work and impression management motives affect leader–member exchange development: A six-wave latent change score model

Ziguang Chen[1], Yuanyuan Huo*[2], Wing Lam[3], Roger Chun-To Luk[4] and Israr Qureshi[5]

[1]University of Derby, UK
[2]University of Surrey, Guildford, UK
[3]University of Manchester, UK
[4]The Hang Seng University of Hong Kong, Siu Lek Yuen, Hong Kong
[5]Australian National University, Canberra, Australian Capital Territory, Australia

Grounded on attribution theory, we propose a dynamic development model to examine the influence of subordinates' and leaders' perceptions of one another's work and impression management (IM) motives on leader–member exchange (LMX) over time in newly formed teams. We test our hypotheses using a two-level bivariate latent change score model to investigate how changes in the quality of LMX from $t-1$ to t relate to perceptions of the subordinate's work motives at $t-1$ while controlling for unobserved individual differences. The implications of our findings for research, method, and practice are discussed.

Practitioner points

- For individual subordinates, strong perceptions of work motives help to build good leader–follower relationships, which in turn should enhance such motives.
- 'You never get a second chance to make a first impression'; employees and managers at all organizational levels should recognize the importance of how their behaviour is perceived at the beginning of their interaction. However, if subordinates are continuously perceived as having high IM motives, this may negatively influence LMX.

As a new employee settles in, establishing a good relationship with his or her supervisor is always a priority. Such a relationship focuses on meeting each other's expectations. However, does the rosy glow of early interpersonal interactions gradually change into a more mature relationship? There has been significant discussion of this issue in the academic literature on the development of leader–member exchange (LMX). Despite the

Correspondence should be addressed to Yuanyuan Huo, Surrey Business School, University of Surrey, Guildford, Surrey, GU27XH, UK (email: y.huo@surrey.ac.uk).

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fundamental importance of social exchange theories and norms of reciprocity in LMX development (Gooty & Yammarino, 2016; Sparrowe & Liden, 1997), the question of how leaders and subordinates achieve LMX of varying quality at different times remains unresolved (Martin, Guillaume, Thomas, Lee, & Epitropaki, 2016). Although a few empirical studies have focused on LMX development processes (Bauer, Green, & Bauer, 1996; Liden, Wayne, & Stilwell, 1993; Nahrgang, Morgeson, & Ilies, 2009), we still know very little about the type of follower behaviour that is associated with this from the point at which the new team is formed.

Maslyn and Uhl-Bien (2001) show that the effort made by both the leader and the subordinate to develop LMX and meet one another's expectations, as rated by the other party, is positively related to exchange quality. For both parties, more effort by oneself and less by the other were related to lower LMX. Although Maslyn and Uhl-Bien (2001) provide initial evidence that the effort made by both parties is positively related to LMX development, we note two major limitations of their study. Firstly, they examined the influence of development effort on LMX using a cross-sectional study, so were unable to capture the dynamic processes involved in LMX development over time. Secondly, the effort put into LMX development was measured using a single and straightforward question, which might not capture all the work done by either party. We therefore go beyond Maslyn and Uhl-Bien's framework in two ways. First, as Maslyn and Uhl-Bien explain, both the leader and the subordinate must see and value the effort the other is making to develop the relationship. Based on attribution theory (Fiske & Taylor, 1991) and the two general concerns (i.e., altruistic and egoistic) of individuals' behaviour (Batson, 1991; Yeung & Saari, 2006), we propose that efforts driven by work motives and the desire for impression management (IM) will affect LMX development over time. Work motives reflect a desire to successfully complete tasks and enhance efficiency, whereas IM denotes a desire to control how one appears to others (Eastman, 1994; Lam, Huang, & Snape, 2007). According to attribution theory, efforts that are perceived as driven by work motives will be valued, whereas those regarded as being IM-driven may be devalued (Eastman, 1994). This in turn may affect LMX development in different ways. Therefore, the purpose of our study is to explore the extent to which perceptions of efforts driven by work and IM motives, respectively, affect the dynamic development of LMX over time.

Second, to overcome the cross-sectional methodological limitation in Maslyn and Uhl-Bien's (2001) study, we propose and test our hypotheses about LMX growth trajectories using a latent change score (LCS) model. Exchange relationships develop gradually, starting from the initial perceptions of motives towards work and IM (Graen & Uhl-Bien, 1995; Lam et al., 2007). It is thus essential to investigate how a leader and a subordinate experience the series of repeated perceptions of each other's motives through the gradual process of developing LMX.

LMX development is a dynamic process involving change and evolution (Martin et al., 2016). To understand how dynamic processes play out in relation to one another, it is important to collect longitudinal within-person data to test LMX development over time. Guided by Shamir's (2005, p. 498) view that 'the social relationship we call leadership is always co-produced by leaders and others [followers]', we undertake a six-wave questionnaire survey of newly established leader–subordinate dyads over a full year. Our primary theoretical contribution is to extend the integration of LMX and attribution theory by providing insight on how leaders' and subordinates' perceptions of each other's work and IM motives contribute to the dynamic development of LMX from the establishment of a new dyad to a year of maturity. Our empirical findings thus complement and extend previous research by demonstrating that the effort made by both parties is positively related to LMX.

Theory and hypotheses development

Social exchange and LMX

The concept of social exchange and the norm of reciprocity have long been used to describe the motives to develop high-quality LMX (Martin et al., 2016; Uhl-Bien & Maslyn, 2003). Central to LMX theory is the notion that consistent honouring of transactional agreements builds mutual respect, trust, affectivity, and loyalty (Schriesheim, Castro, Zhou, & Yammarino, 2001). In applying social exchange theory to LMX, researchers have described LMX development as occurring through a series of steps, beginning with an initial interaction in which leaders usually provide initial offers of resources and support to their subordinates. Then, in subsequent exchanges, each party tests the other to determine whether they can build relational components such as trust, respect, and obligation, thereby allowing a high-quality exchange to develop (Nahrgang et al., 2009). Underlying the social exchange perspective is the assumption that exchanges are based on the efforts made by both parties. Each may try to initiate and reciprocate exchanges (Maslyn & Uhl-Bien, 2001).

When considering their partner's efforts in LMX, the leader or subordinate must perceive and value that partner's efforts (Smith, 2006), which should then drive higher LMX quality. Steiner (1997) argues that attribution theory can be useful in understanding the dynamic nature of the exchange process within a dyad. Dienesch and Liden (1986) examine the role of attribution in developing the relationship between leaders and subordinates. However, the types of attribution and perceptions involved are still not clear; it is therefore worthwhile to empirically investigate how attribution matters in the LMX development from initial stages to maturity.

Attribution theory and LMX

According to Fiske and Taylor (1991, p. 23), attribution theory describes 'how the social perceiver uses information to arrive at causal explanations for events. It examines what information is gathered and how it is combined to form a causal judgment'. People make sense of another person's behaviour through perceptions of their motives (Thomas & Pondy, 1977). The perceived motives of subordinates or leaders may influence the perceivers' own behaviour (Lam et al., 2007). Generally speaking, there are two kinds of motives involved in making attributions of others' behaviour, namely altruistic and egoistic concerns (Batson, 1991; Yeung & Saari, 2006). People with altruistic concerns focus on improving work tasks and performance, while those focusing on egoistic concerns may aim to create a good image (through activity such as IM).

Consistent with the framework of altruistic and egoistic concerns and motives, Dasborough and Ashkanasy (2002) further theorize that member attribution of the motives for leaders' behaviour could be differentiated into sincere (other-focused) versus self-serving (self-focused) interests. Lam et al. (2007) similarly suggest that leaders may attribute subordinates' feedback-seeking behaviour to either performance enhancement or IM motives. Based on this, we examine how leaders and subordinates attribute the other party's efforts (in terms of perceived work or IM motives) in a new dyad, and how this affects their LMX development over time.

Dynamic process between leaders and subordinates in developing LMX

Given that there is a great deal of interaction between leaders and subordinates within a dyad, there are many opportunities for each to make attributions of the other's efforts. Individuals are likely to make attributions spontaneously when they are dependent on one another for the desired outcomes and when they expect future interactions (Monson, Keel, Stephens, & Genung, 1982), both of which are characteristics of LMX.

According to attribution theory and the dynamic nature of LMX, we propose that the attribution process takes place for both leaders and subordinates. After determining the intention of an actor's influence attempt, the perceiver uses the attribution of a particular motive as a vehicle to help interpretation and then to classify the actor's behaviour (Ferris, Bhawuk, Fedor, & Judge, 1995). In terms of the leader's perceptions, researchers show that leaders make attributions of staff behaviour and effort, which influences how they treat those subordinates (Dienesch & Liden, 1986; Lam et al., 2007). We therefore propose that attributions from leaders and subordinates concerning the other's motives will influence how they evaluate, interpret, and eventually label the other's efforts (Dasborough & Ashkanasy, 2002). These attributions have a dynamic impact on whether leaders and subordinates perceive the other's efforts as altruistic and sincere (i.e., perceived work motives) or egoistic and manipulative (i.e., perceived IM motives), which may affect LMX.

Perceived work motives and LMX

If individuals help others to accomplish work tasks and to perform at a higher level, others may show their appreciation in return. This may be attributed as altruistic and sincere and therefore likely to be perceived as high in work motives. Based on attribution theory, we predict a relationship between perceived work motives and LMX in which the appraisal of the other party's motive as either work based or altruistic will lead to the development of a belief that one can benefit from the resources and support they offer. Thus, one is more likely to benefit from the motives of the other party and accomplish their work smoothly.

In LMX theory, exchanges between dyadic parties should be essentially work-related and consist of work-related behaviour, such as efforts to complete task assignments (Day & Crain, 1992). It is easier for leaders to consider high-performing individuals as in-group members (Graen & Uhl-Bien, 1995), enabling such individuals to be clear how to behave in, and what to expect from, a social environment in which they are regarded as good performers (Hogg & Terry, 2000). In return, the subordinates feel positive about the quality of LMX. Related research has also shown that a leader interprets the motive behind a subordinate's feedback-seeking as performance enhancement, thinking of the subordinate as achievement-focused and seeking to meet a high standard in accomplishing work tasks (Crant, 2000). This is conducive to high-quality LMX (Lam et al., 2007).

Therefore, both the attribution and LMX theories suggest that there are likely to be variations in the level of effort made by both dyadic parties at different times. Perceptions of work motives should help to explain such variations over time. Based on this theoretical foundation, we develop the following hypotheses related to the main effects of perceived work motives and their trajectories:

Hypothesis 1. The subordinate's perceived work motives (PSWM) is positively related to LMX.

Hypothesis 2. The leader's perceived work motives (PLWM) is positively related to LMX.

Perceived IM motives and LMX

People are likely to perceive others differently if they think they are trying to control the way in which they appear. Therefore, a person may attribute someone's efforts as egoistic and manipulative (Eastman, 1994; Lam et al., 2007), both of which are regarded as highly characteristic of IM. IM is a process through which an individual attempts to influence the perceptions of other people by regulating and controlling information in social interactions (Goffman, 1959). IM motives refer to the desire of an individual to control how he or she appears to others by attempting to shape the impressions people form of them (Lam et al., 2007).

Perceived IM motives should also help to explain variations in the effort made by both members to develop a dyad over time. We predict that when a leader or subordinate in a new dyad interprets the other party's efforts as being driven by IM, they will tend to perceive that party as manipulative and calculating (Ashforth, Harrison, & Corley, 2008). IM motives are egoistic and inspire a person to look for opportunities to enhance their own public image, resulting in less likelihood of beneficial commitment. People usually form negative attitudes towards those they believe are trying to manipulate them (e.g., Eastman, 1994). Such individuals are easily identified as egoistic since their focus is on their own needs (Pratt, 1998), which has a negative effect on LMX development.

Fodor (1973, 1974) and Graen and Uhl-Bien (1995) show that subordinates who attempt to impress their leaders are not rewarded any more than those who do not, but are more likely to be perceived as untruthful, unreliable, calculating, or manipulative. For example, if a leader attributes a subordinate's feedback-seeking to IM motives, the behaviour is less likely to create a positive impression, less support will be offered, and the feedback-seeking behaviour is less likely to be associated with high-quality LMX (Lam et al., 2007). Based on this theoretical reasoning, we develop the following hypotheses related to the main effects of perceived IM motives and their trajectories:

Hypothesis 3. The subordinate's perceived IM motives (PSIMM) is negatively related to LMX.

Hypothesis 4. The leader's perceived IM motives (PLIMM) is negatively related to LMX.

We illustrate the proposed hypotheses in Figure 1.

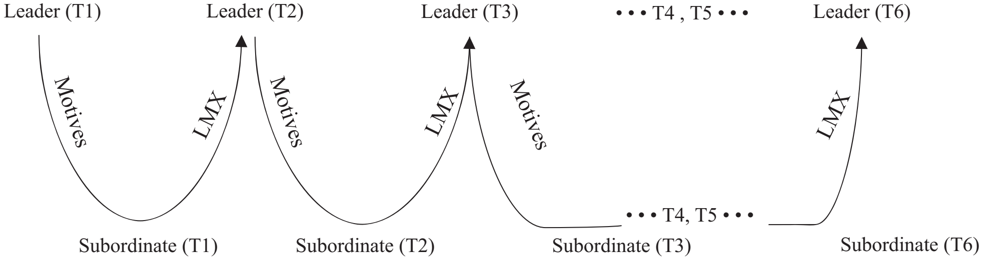

Figure 1. Conceptual Diagram of Reciprocity between Leader and Subordinate over Time. *Note:* T1, T2, T3, and T6 = Time 1, Time 2, Time 3, and Time 6. Time 4 and Time 5 were included but not shown.

Method

Participants

We collected data from 72 team leaders and their 212 subordinates working for three hotels across in China. Participants had worked for approximately 2 weeks (12–16 days) in newly established teams prior to the data collection. All questionnaires were paper-based.

In a longitudinal design with six time points (from T1 to T6), data were gathered from both subordinates and leaders. At T1, when teams had been in place for 2 weeks, we asked participants to fill out a set of questionnaires including demographic information, motives, and LMX. Participants were then asked to rate the other party on motives and LMX at T2 to T6, which took place one, two, four, six, and 12 months after the team had been formed. Upon completion, respondents were offered a cash incentive of RMB 20 *Yuan* (≈US$3) per wave.

Responses from 581 subordinates (74.39%) and 104 leaders (80.00%) were obtained at T1; for T2 to T6, there were 553 (95.18%), 447 (80.83%), 359 (80.31%), 277 (63.23%), and 212 (76.53%) participating subordinates, and 100 (96.15%), 97 (97%), 86 (88.66%), 78 (90.70%), and 72 (92.31%) participating leaders.[1] On average, each leader had 2.83 subordinates. The mean age of the final sample of subordinates was 24.2 ($SD =$ 7.82 years), of whom 52.4% were female, and 29.7% had completed higher secondary school or above. The mean age of leaders was 28.8 ($SD = 5.83$ years), of which 54.2% were female, and 50% had completed higher secondary school or above.

Measures

A back-translation method was used to translate the items from English into Chinese (Brislin, Lonner, & Thorndike, 1973). Both alpha (α) and McDonald's (1999) composite reliability (ω) were reported, as ω may have less bias than α (Geldhof, Preacher, & Zyphur, 2014).

Perceived work motives

A 4-item scale (Allen & Rush, 1998; Lam et al., 2007) was used to assess perceived work motives of the other party (1 = *strongly disagree*, 7 = *strongly agree*). PLWM was rated by subordinates within the group. A sample item is 'Your supervisor puts effort into you because he or she desires to help you accomplish your work tasks' (team-level $\alpha = .86$ to .95 from T1 to T6, except for T3 = .14; team-level $\omega = .91$ to .99; subordinate-level $\alpha = .77$ to .86; subordinate-level $\omega = .89$ to .86).[2] PSWM was rated by supervisors. A sample item is 'This subordinate puts effort into you because he or she desires to help you accomplish your work tasks' (team-level $\alpha = .94$ to .98; team-level $\omega = .95$ to .97; subordinate-level $\alpha = .66$ to .81; subordinate-level $\omega = .65$ to .82).

[1] *With respect to the attrition rate, we analysed the differences in demographic characteristics between participants who completed questionnaires across all six waves and those who did not. With one-way ANOVAs, we found no systematic discrepancy in leaders' gender ($F(1, 146) = .49$, $p = .484$) or age ($F(1, 145) = .11$, $p = .745$); or in subordinate's gender ($F(1, 567) = .96$, $p = .327$) or age ($F(1, 566) = 2.94$, $p = .087$). This indicated there was no significant difference in terms of gender and age between dropouts and participants who completed all waves of the survey.*

[2] *To ensure the reliability of each measure on all six measurement occasions, alpha (α) and McDonald's (1999) composite reliability (ω) were reported at team (i.e., leader) and subordinate levels, respectively.*

Perceived IM motives

A 3-item perceived IM motives scale was taken from Lam et al. (2007) to capture the extent to which one perceived the other party's IM effort (1 = *strongly disagree*, 7 = *strongly agree*). PLIMM was rated by subordinates. A sample item is 'Your supervisor puts effort into you because he or she desires to catch your attention' (team-level $\alpha = .80$ to .94; team-level $\omega = .86$ to .99; subordinate-level $\alpha = .73$ to .79; subordinate-level $\omega = .73$ to .79). PSIMM was rated by supervisors. A sample item is 'This subordinate puts effort into you because he or she desires to catch your attention' (team-level $\alpha = .79$ to .95; team-level $\omega = .80$ to .86; subordinate-level $\alpha = .55$ to .71; subordinate-level $\omega = .57$ to .72).

LMX

Subordinates rated the quality of LMX based on Graen and Uhl-Bien's (1995) 5-point, 7-item scale. A sample item is 'I have enough confidence in my leader that I would defend and justify his/her decision if he/she were not present to do so' (team-level $\alpha = .78$ to .98; team-level $\omega = .88$ to .99; subordinate-level $\alpha = .79$ to .84; subordinate-level $\omega = .80$ to .87).

LCS model

We utilized a LCS model (McArdle, 2009), previously known as a latent difference score model, to test our hypotheses. LCS modelling is built upon structural equation modelling with latent variables (Ferrer & McArdle, 2010). It integrates aspects of cross-lagged and latent-curve models such that bivariate LCS simultaneously taps the individual difference around a trajectory while examining the dynamic interplay between two variables, say *Y* and *X* (McArdle, 2009). LCS features latent difference scores that indicate the change in true scores of *Y* and *X* from the previous occasion (i.e., $t - 1$) to the present (i.e., t). Drawing upon the notation used by Grimm, An, McArdle, Zonderman, and Resnick (2012), latent difference scores of *Y* and *X* can be expressed as:

$$\Delta y[t] = \alpha_y s_y + \beta_y y[t-1] + \gamma_{yx} x[t-1] \quad (1)$$

$$\Delta x[t] = \alpha_x s_x + \beta_x x[t-1] + \gamma_{xy} y[t-1] \quad (2)$$

The latent difference score is a function of three components, namely constant change, proportional change, and a coupling effect. A constant change model is $\alpha_y s_y$ and $\alpha_x s_x$ under which α_y and α_x are fixed parameters set at one and s_y and s_x are the constant change components. It simulates an accumulative force added upon the change in a variable beginning at t and onward. s_y and s_x has a mean of μ_{sy} and μ_{sx} with a variance of σ^2_{sy} and σ^2_{sx}. A proportional change model ($\beta_y y[t-1]; \beta_x x[t-1]$) is the extent to which *Y* (or *X*) at $t - 1$ influences *Y* (or *X*) at t. The proportional change parameters of β_y and β_x are time-invariant. The coupling effect ($\gamma_{yx} x[t-1]$, $\gamma_{xy} y[t-1]$) is a cross-lagged effect of how the scores on the other variable at $t - 1$ impact the scores on the focal variable at t. Coupling effects parameters of γ_{yx} and γ_{xy} are time-invariant. Equipped with the three components, bivariate LCS addresses our hypothesis testing in the way that change in one variable from $t-1$ to t is related to the level of another variable at $t-1$.[3]

Observations were not independent as subordinates were nested within teams. Therefore, in our study, the LCS model was run under a two-level context, with subordinates at within-team level (level 1) and teams at between-team level (level 2). With a moderately small sample size of 72 at the team level, latent variable structural equation modelling generated an overwhelmingly large number of parameters, risking a non-convergent solution. To remedy this, we substituted the unobserved true scores for the observed average item scores, with the prerequisite that the measurement models were held to decompose the average item scores into one component for within-team and the other for between-team levels. Notably, we endorsed the observed group mean centring approach, in which the between-level component from a variable is equal to the group mean of the aggregated scores and its within-level component is obtained by subtracting the group mean from the aggregated scores of individual subordinates. Eventually, the between- and within-level components of a variable were used to derive the LCS. Despite the failure to take the measurement errors into account (e.g., Marsh, Hau, & Wen, 2004), observed group mean centring is more accurate than latent variable centring for data with a small number of clusters (Asparouhov & Muthén, 2019).

Using Figure 2 (between level) and Figure 3 (within level), we outlined a path diagram of a two-level bivariate LCS model where $Y_b[0]$ to $Y_b[5]$ and $X_b[0]$ to $X_b[5]$ were six between-level repeated measures and $Y_w[0]$ to $Y_w[5]$ and $X_w[0]$ to $X_w[5]$ were within-level measures. Taking Y for illustration, the between-level observed scores (group mean scores) are the summation of the between-level latent true scores ($y_b[0]$ to $y_b[5]$) and between-level unique (error) scores ($u_{yb}[0]$ to $u_{yb}[5]$). The within-level observed scores (group mean centring scores) are composed of the within-level latent true scores ($y_w[0]$ to $y_w[5]$) and within-level unique scores ($u_{yw}[0]$ to $u_{yw}[5]$). At the between and within levels, the unique scores have means of zero, with a time-invariant variance of σ^2_{uyb} and σ^2_{uyw}, neither of which are permitted to covary across times. The latent difference score for Y is equivalent to subtracting the score at $t-1$ from the score at t, written at each level as:

$$Y_b[t] = Y_b[t-1] + \Delta Y_b[t] \tag{3}$$

$$Y_w[t] = Y_w[t-1] + \Delta Y_w[t] \tag{4}$$

The same notation and logic also apply to X. As discussed, the latent difference scores ($\Delta Y_b[t]$ for Y; $\Delta X_b[t]$ for X) have three between-level components:

$$\Delta y_b[t] = \alpha_{yb} s_{yb} + \beta_{yb} y_b[t-1] + \gamma_{yxb} x_b[t-1] \tag{5}$$

$$\Delta x_b[t] = \alpha_{xb} s_{xb} + \beta_{xb} x_b[t-1] + \gamma_{xyb} y_b[t-1] \tag{6}$$

Parameters α_{yb} and α_{xb} are fixed at one. The constant change components for Y (s_{yb}) and for X (s_{xb}) have a mean of μ_{syb} and μ_{sxb} and a variance of σ^2_{syb} and σ^2_{sxb}, respectively. The

[3] *One assumption of longitudinal data modelling is that study variables are equidistant or the intervals between any two adjacent occasions are equivalent in distance, which allows equations to cancel out the time lag. Although our data with an uneven time lag were in breach of the assumption, LCS holds some flexibility towards uneven time intervals (McArdle & Hamagami, 2001). Although latent growth-curve model, alternative to LCS, is capable of handling the unequal time interval of data collection by adjusting the latent slope accordingly, it is not designed to simulate the dynamics between study variables. Therefore, we adhered to the LCS model.*

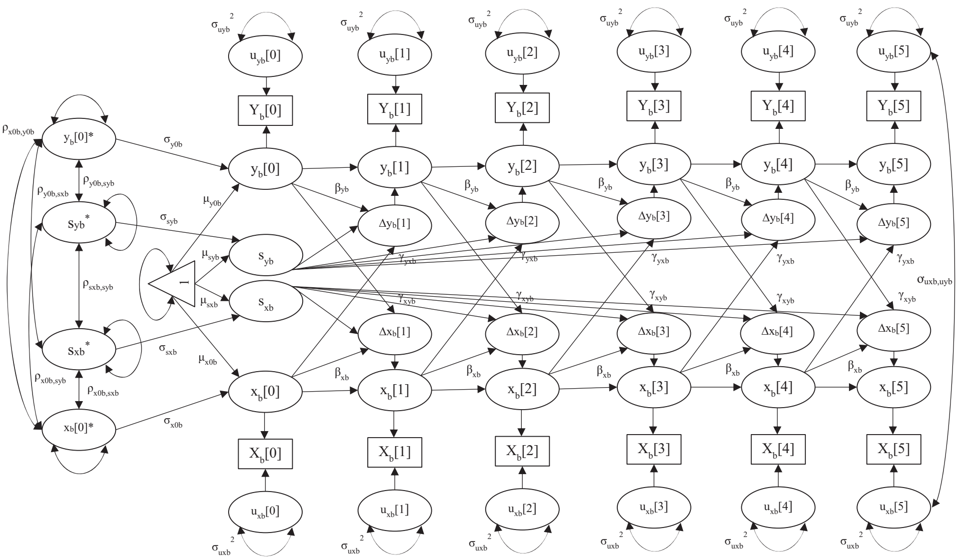

Figure 2. Path Diagram of Two-level LCS at Between Level. *Note:* Modified from Grimm et al. (2012). Unlabelled paths are fixed at 1.

initial true scores for $Y(Y_b[0])$ and for $X(X_b[0])$ have a mean of μ_{y0b} and μ_{x0b} and a variance of σ^2_{y0b} and σ^2_{x0b}. The two constant change components and two initial true scores are permitted to covary, as denoted by $\rho_{y0b,sxb}$, $\rho_{x0b,y0b}$, $\rho_{x0b,syb}$, $\rho_{y0b,syb}$, $\rho_{sxb,syb}$ and $\rho_{x0b,sxb}$ (see also Grimm et al., 2012). Substituting the subscript b for w, we have the following equations for the latent within-level difference scores:

$$\Delta y_w[t] = \alpha_{yw} s_{yw} + \beta_{yw} y_w[t-1] + \gamma_{yxw} x_w[t-1] \tag{7}$$

$$\Delta x_w[t] = \alpha_{xw} s_{xw} + \beta_{xw} x_w[t-1] + \gamma_{xyw} y_w[t-1] \tag{8}$$

Covariances are freely estimated among the two constant change components (s_{yw}, s_{xw}) and the two initial true scores ($y_w[0], x_w[0]$), as denoted by $\rho_{y0w,sxw}$, $\rho_{x0w,y0w}$, $\rho_{x0w,syw}$, $\rho_{y0w,syw}$, $\rho_{sxw,syw}$ and $\rho_{x0w,sxw}$. In contrast to the between-level measures, the means of the within-level initial true scores (μ_{y0w}, μ_{x0w}) and constant change components (μ_{syw}, μ_{sxw}) are fixed to zero, as a result of the observed group mean centring. As such, the mean structure for the initial true scores and constant change components are absent from the within-level construct shown in Figure 3.[4] Table 1 summarizes the coefficient labels used in Figures 2 and 3.

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[4] *When a subordinate had a constant change of variable Y (or X) equal to the group average, the estimate of constant change was on a par with zero (i.e.,* $s_{yw} = \mu_{syw} = 0$*) and the within-level latent difference score equation of Y and X can be reduced to:*

$$\Delta y_w[t] = \beta_{yw} y_w[t-1] + \gamma_{yxw} x_w[t-1] \quad (i)$$

$$\Delta x_w[t] = \beta_{xw} x_w[t-1] + \gamma_{xyw} y_w[t-1] \quad (ii)$$

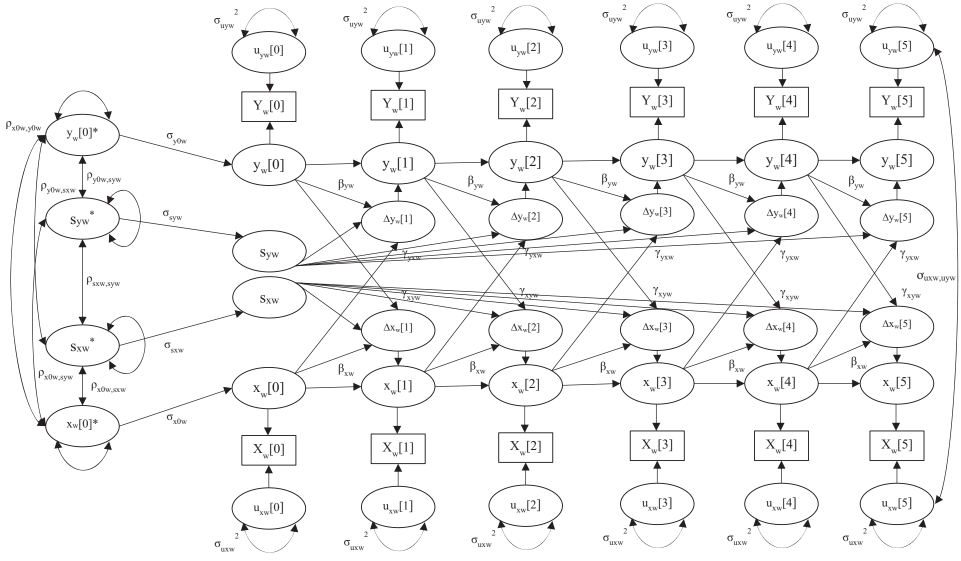

Figure 3. Path Diagram of Two-level LCS at Within Level. *Note:* Modified from Grimm et al. (2012). Unlabelled paths are fixed at 1.

Table 1. Parameter definition of the two-level latent change score model

Parameter	Definition
Between level	
μ_{x0b} / μ_{y0b}	Mean of initial true score of variable *X*/*Y* at between level
$\sigma^2_{x0b}/\sigma^2_{y0b}$	Variance of initial true score of variable *X*/*Y* at between level
μ_{sxb} / μ_{syb}	Mean of constant change of variable *X*/*Y* at between level
$\sigma^2_{sxb}/\sigma^2_{syb}$	Variance of constant change of variable *X*/*Y* at between level
β_{xb}/β_{yb}	Proportional change of variable *X*/*Y* at between level
$\gamma_{yxb}/\gamma_{xyb}$	Coupling effect for the effect of *X*/*Y* on subsequent changes in *Y*/*X* at between level
Within level	
μ_{x0w}/μ_{y0bw}	Mean of initial true score of variable *X*/*Y* at within level (equal to zero and not shown in Figure 3)
$\sigma^2_{x0w}/\sigma^2_{y0w}$	Variance of initial true score of variable *X*/*Y* at within level
μ_{sxw}/μ_{syw}	Mean of constant change of variable *X*/*Y* at within level (equal to zero and not shown in Figure 3)
$\sigma^2_{sxw}/\sigma^2_{syw}$	Variance of constant change of variable *X*/*Y* at within level
β_{xw}/β_{yw}	Proportional change parameter of variable *X*/*Y* at within level
$\gamma_{yxw}/\gamma_{xyw}$	Coupling effect for the effect of *X*/*Y* on subsequent changes in *Y*/*X* at within level

Note:. Notation adopted from Grimm et al. (2012).

The two-level LCS models were estimated in Mplus Version 7.11 (Muthén & Muthén, 1998-2012; see also Klopack & Wickrama, 2019). A total of 212 participants in 72 groups were entered in the analyses. As the study variables were normally distributed with univariate skewness running between −1.08 and 0.04 and kurtosis between −0.48 and 1.67, we applied maximum likelihood (ML) estimation to all models including the

Table 2. Fit statistics of measurement invariance tests over time

Model	χ^2	*df*	RMSEA	CFI	TLI	SRMR	ΔCFI	ΔRMSEA
LMX								
Configural	1132.78	699	.054	.908	.887	.059	–	–
Metric	1188.03	734	.054	.904	.887	.069	–.004	<.001
Scalar	1249.40	764	.055	.897	.884	.072	–.007	.001
PSWM								
Configural	326.38	177	.063	.957	.932	.048	–	–
Metric	363.12	197	.063	.952	.932	.102	–.005	<.005
Scalar	392.69	212	.063	.948	.932	.105	–.004	<.001
PSIMM								
Configural	255.64	75	.107	.925	.848	.090	–	–
Metric	284.93	90	.101	.920	.863	.109	–.004	–.006
Scalar	319.76	100	.102	.909	.861	.114	–.011	.001
PLWM								
Configural	384.09	177	.074	.925	.883	.055	–	–
Metric	415.72	197	.072	.921	.889	.077	–.002	–.002
Scalar	444.05	212	.072	.916	.891	.082	–.005	<.001
PLIMM								
Configural	91.12	75	.032	.991	.981	.035	–	–
Metric	109.24	90	.032	.989	.981	.046	–.004	<.001
Scalar	147.64	100	.047	.973	.959	.047	–.016	.015

Note:. $N = 212$. LMX = leader–member exchange; PSWM = perceived subordinate's work motives; PSIMM = perceived subordinate's impression management motives; PLWM = perceived leader's work motives; PLIMM = perceived leader's impression management motives. RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker–Lewis index; and SRMR = standardized root mean square residual. Configural = equal factor structures; metric = equal factor loadings; and scalar = equal item intercepts and equal factor loadings.

measurement and structural models. The χ^2 statistics and descriptive fit indices (RMSEA, CFI, TLI, and SRMR) were used to assess the model adequacy.

Results

Measurement invariance over times

To justify our interpretation of the LCS models (Kim, Wang, & Liu, 2020), we calculated the longitudinal measurement invariance, or the configural, metric, and scalar equivalence for each variable measure, across a six time points. The residual variances for the same item over time were free to covary. The traditional model fit criteria based on multigroup confirmatory factor analysis (CFA) with two groups (ΔCFI $< -.01$; ΔRMSEA $< .015$; Chen, 2007; Cheung & Rensvold, 2002) were deemed too stringent to our six-wave study. Instead, we opted for a relatively liberal criterion (ΔCFI $< -.02$; ΔRMSEA $< .03$; Rutkowski & Svetina, 2014). Table 2 sets out the fit statistics of the measurement invariance tests in which the changes in CFIs ($-.016$ to $-.002$) and the changes in RMSEAs ($-.006$ to $.015$) were within the criteria and flagged the establishment of measurement invariances. It may therefore be inferred that all measures had identical and stable psychometric properties across all six measurement occasions.

Single-level measurement models by waves

CFA was performed to decide whether the five study variables (PSWM, PSIMM, PLWM, PLIMM, and LMX) could be differentiated from each other on each of the six measurement occasions. The targeted five-factor model where 21 items were loaded onto five factors correspondingly yielded acceptable fit statistics (RMSEAs = .06 to .08; CFIs = .86 to .93; TLIs = .84 to .92; SRMRs = .06 to .08). Although the CFIs and TLIs at some time points failed to pass the conventional threshold of .90, such a threshold has never been a gold standard (Marsh et al., 2004). In the five-factor model, all the standardized factor loadings were significant at $p < .001$. As such, we were confident that the five factors were distinguishable from each other throughout all six waves.[4] Table 3 provides a summary of the fit statistics of the proposed models across the six waves.

Multilevel measurement models with cross-level invariances

Having identified the distinctiveness of the study variables at the individual level using a single-level CFA alongside non-negligible team variances,[5] we proceeded with the two-level measurement models. For each measurement occasion, we ran a set of three two-level measurement models (Models i to iii) whose fit statistics are shown in Table 4. We began with a two-level, one-factor structure model (Model iii) in which all 21 items loaded onto one common factor at both levels, with no constraints added. It yielded a poor to mediocre fit, with RMSEAs = .08 to .09, CFIs = .61 to .64, TLIs = .57 to .62, and SRMRs at between level ($\text{SRMRs}_{\text{Between}}$) = .29 to .40, and within level ($\text{SRMRs}_{\text{Within}}$) = .13 to .14. We continued with a two-level, five-factor model (Model ii) where items loaded onto the five common factors correctly at two levels with no constraints applied. Fit indices showed an acceptable fit, with RMSEAs = .03 to .04, CFIs = .93 to .97, TLIs = .91 to .96, $\text{SRMRs}_{\text{Between}}$ = .17 to .34 and $\text{SRMRs}_{\text{Within}}$ = .07 to .08. Finally, we ran a cross-level invariance five-factor model (Model i) where we added equality constraints to the factor loadings at two levels. We obtained a plausible fit from Model i, with RMSEAs = .03 to .04, CFIs = .90 to .95, TLIs = .91 to .95, $\text{SRMRs}_{\text{Between}}$ = .17 to .27, and $\text{SRMRs}_{\text{Within}}$ = .07 to .08. Across the various occasions, the model adequacy for Model i was comparable to that of Model ii. Although the RMSEAs and CFIs on some occasions performed less well in the cross-level invariance models (Model i) than the constraint-free model (Model ii), the

[4] *We tested a series of competing models against the target models. In a three-factor solution, the two perceived work motives (PSWM & PLWM) formed the first factor and the two perceived IM motives (PSIMM & PLIMM) constituted the second, with LMX as the third factor. In a two-factor model, we combined the subordinate-rated variables (PLWM, PLIMM, and LMX) as one factor and the leader-rated variables (PSWM & PSIMM) as the other. A one-factor model merely loaded all 21 items onto a single factor. In terms of fit statistics, neither the best fit of the three-factor model (RMSEAs = .13 to .14; CFIs = .58 to .64; TLIs = .52 to .59; SRMRs = .13 to .18), the two-factor models (RMSEAs = .11 to .13; CFIs = .70 to .76; TLIs = .67 to .73; SRMRs = .09 to .10), or the one-factor models (RMSEAs = .16 to .18; CFIs = .38 to .52; TLIs = .31 to .46; SRMRs = .13 to .17) outperformed the five-factor models.*

[5] *To ascertain whether the hierarchical structure of the leader–subordinate data obligated us to make use of items to tap into constructs of interest at team level (Dyer, Hanges, & Hall, 2005), we undertook a multilevel CFA (ML-CFA). Latent-factor intraclass correlations (ICC), or the proportion of the variance of a study variable explained by between level to the total variances explained by both the between- and within-level data, ran from .07 to .27 for LMX, from .42 to .75 for PSWM, from .67 to .80 for PSIMM, from .01 to .23 for PLWM, and from .11 to .20 for PLIMM. Among the five variables in the study, the greatest ICCs were found for PSWM and PSIMM, suggesting that over half of the variance in perceived subordinate motives could be explained at the team or leader level, whereas the remaining study variables could mainly be explained at the subordinate level. The ICC for all the study variables over all six occasions was .36 on average, inferring that the team level explained 36% of the variance in the variables on average. Accordingly, therefore it was not preferable to neglect the team-level variances.*

Table 3. Fit statistics of measurement models in single-level confirmatory factor analysis by six waves

Model	χ^2	*df*	RMSEA	CFI	TLI	SRMR
Time 1						
Five-factor Model	303.52	179	.058	.926	.914	.061
Three-factor Model	796.52	186	.126	.639	.592	.153
Two-factor Model	606.36	188	.104	.752	.723	.087
One-factor Model	1127.08	189	.155	.445	.383	.155
Time 2						
Five-factor Model	431.88	179	.083	.865	.842	.075
Three-factor Model	981.93	186	.144	.576	.522	.177
Two-factor Model	742.26	188	.120	.705	.670	.097
One-factor Model	1265.34	189	.166	.427	.363	.160
Time 3						
Five-factor Model	317.98	179	.062	.927	.914	.055
Three-factor Model	870.55	186	.135	.638	.592	.166
Two-factor Model	648.04	188	.110	.757	.728	.092
One-factor Model	1358.34	189	.175	.382	.314	.173
Time 4						
Five-factor Model	320.95	179	.062	.931	.920	.065
Three-factor Model	961.87	186	.141	.625	.577	.162
Two-factor Model	818.12	188	.127	.695	.660	.102
One-factor Model	1479.27	189	.181	.376	.307	.165
Time 5						
Five-factor Model	347.33	179	.067	.910	.894	.068
Three-factor Model	871.67	186	.132	.632	.584	.149
Two-factor Model	708.10	188	.115	.721	.688	.093
One-factor Model	1226.40	189	.162	.443	.381	.147
Time 6						
Five-factor Model	389.76	179	.075	.894	.875	.064
Three-factor Model	900.94	186	.135	.640	.594	.125
Two-factor Model	786.20	188	.123	.699	.664	.098
One-factor Model	1150.44	189	.155	.516	.462	.133

Note:. *N*s = 207 (T1), 206 (T2), 201 (T3), 209 (T4), 210 (T5), and 212 (T6). Three-factor model combined two perceived work motives (PSWM and PLWM) into a factor, and two perceived impression management motives (PSIMM and PLIMM) into a factor, along with LMX as a separate factor. Two-factor model combined subordinate-rated study variables (PLWM, PLIMM, and LMX) as a factor and leader-rated study variables (PSWM and PSIMM) as a factor.

discrepancy was small and negligible.[6] Accordingly, we endorsed the cross-invariance model (Model i) over the constraint-free model (Model ii). The establishment of cross-level invariance models ascertained that factors at two levels can be seen as the within-team

[6] *In three out of six waves, we saw that $SRMRs_{Between}$ dropped further and improved when equality constraints were added to the factor loadings. Across all the models tested, we speculated that $SRMR_{Within}$ was smaller than $SRMR_{Between}$, with the possible implication that the within-level model fitted well at subordinate level while the between-level model fitted poorly at the team level. The discrepancy between the two level-specific SRMRs that had been observed in previous studies (e.g., Cheung, Leung, & Au, 2006) could be attributed to the sample size difference. The number of observations at the individual level (207) was substantially greater than the number of clusters at the team level (72). The measurement model at the between level may not fit well with an insufficient number of observations at the team level. Nevertheless, the five-factor models (Models i and ii) consistently outperformed the one-factor model counterpart (Model iii) in terms of model adequacy across all six measurement occasions. Thus, we validated a two-level, five-factor structure of 21 item measurements.*

Table 4. Fit statistics of multilevel confirmatory factor analysis by waves

Model	χ^2	*df*	RMSEA	CFI	TLI	SRMR
Time 1						
1i. Five-factor, cross-level invariances	454.85	374	.032	.943	.936	.195/.075
1ii. Five-factor, constraint-free	429.87	358	.031	.950	.941	.199/.074
1iii. One-factor, constraint-free	895.36	378	.081	.638	.597	.317/.141
Time 2						
2i. Five-factor, cross-level invariances	525.30	374	.044	.903	.891	.259/.072
2ii. Five-factor, constraint-free	463.05	358	.038	.933	.921	.336/.072
2iii. One-factor, constraint-free	912.12	378	.083	.657	.619	.399/.126
Time 3						
3i. Five-factor, cross-level invariances	493.91	374	.040	.925	.915	.273/.068
3ii. Five-factor, constraint-free	438.11	358	.033	.950	.941	.295/.069
3iii. One-factor, constraint-free	996.74	378	.090	.612	.568	.296/.141
Time 4						
4i. Five-factor, cross-level invariances	452.75	374	.032	.953	.947	.264/.074
4ii. Five-factor, constraint-free	410.45	358	.026	.969	.963	.241/.069
4iii. One-factor, constraint-free	1029.60	378	.091	.610	.567	.311/.134
Time 5						
5i. Five-factor, cross-level invariances	474.76	374	.036	.931	.923	.166/.076
5ii. Five-factor, constraint-free	440.86	358	.033	.944	.934	.171/.077
5iii. One-factor, constraint-free	914.80	378	.082	.635	.594	.287/.129
Time 6						
6i. Five-factor, cross-level invariances	518.84	374	.043	.919	.909	.197/.069
6ii. Five-factor, constraint-free	489.08	358	.042	.927	.914	.234/.068
6iii. One-factor, constraint-free	1071.07	378	.093	.613	.570	.350/.142

Note:. *Ns* = 207 (T1), 206 (T2), 201 (T3), 209 (T4), 210 (T5), and 212 (T6). Cross-level invariances refer to the equality constraint imposed upon factor loadings across two levels.

(subordinate) and between-team (team) level components of the same latent variable (Jak & Jorgensen, 2017).

Hypothesis testing

Measuring the five study variables over six occasions yielded a total of 30 variables. Accordingly, we divided these into two groups according to their descriptive statistics and intercorrelations (Group-I variables: PSWM, PSIMM, and LMX; Group-II variables: PLWM, PLIMM, and LMX). Tables 5 and 6 set out the means, standard deviations, and intercorrelations among the Group-I and Group-II variables. Each of the four models was used to test one hypothesis using two variables (*Y* and *X*). While LMX was set as variable *Y* across four models, the role of variable *X* was taken by PSWM, PLWM, PSIMM, and PLIMM in Models, 2, 3, and 4, respectively. Table 7 provides all the key parameter estimates of the bivariate LCS for all four models tested.

Lagged effect of subordinate's perceived work motives on change in LMX

For H1, we specified Model 1 with PSWM as *X* and LMX as *Y*, which fit the data well ($\chi^2(138) = 244.46$, $p < .001$; RMSEA = .06; CFI = .92; TLI = .92; $SRMR_{Between} = .06$;

Table 5. Means, standard deviation, and correlations for group-I variables (LMX, PSWM, and PSIMM)

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. LMX T1	3.59	.66		(.17)	(.18)	.76	(.02)	(–.10)	.60	(.09)	(.08)	.61	(.02)	(–.03)	.61	(.18)	(.02)	.53	(.11)	(.00)
2, PSWM T1	5.78	.74	.18		.60	.27	.58	.51	.25	.44	.33	(.16)	.56	.39	(.21)	.53	.34	.24	.41	(.19)
3. PSIMM T1	5.17	1.11	.16	.61		.25	.42	.68	(.20)	.39	.62	(.11)	.40	.52	.31	.38	.45	(.22)	.25	.43
4. LMX T2	3.45	.65	.64	.26	.17		(.11)	.04	.72	.28	(.13)	.69	(.17)	(.10)	.63	(.15)	(–.03)	.61	(.15)	(–.03)
5. PSWM T2	5.65	.70	(.11)	.55	.45	.18		.55	(.16)	.60	.28	(.03)	.62	.39	(.05)	.57	(.20)	(.17)	.60	.29
6. PSIMM T2	5.06	1.09	(–.02)	.48	.62	.14	.51		(–.01)	.36	.71	(–.09)	.32	.48	(.10)	.33	.41	(.01)	.32	.37
7. LMX T3	3.39	.64	.52	.17	(.10)	.58	(.07)	(.05)		(.22)	(.14)	.62	.23	.24	.67	.29	(.04)	.73	(.23)	(.05)
8. PSWM T3	5.49	.83	.19	.50	.47	.23	.62	.38	.19		.47	.28	.67	.56	(.21)	.61	.42	(.16)	.64	.48
9. PSIMM T3	5.06	1.08	(.13)	.41	.65	.14	.42	.67	.17	.57		(.06)	.32	.62	(.17)	.39	.61	(.04)	.36	.54
10. LMX T4	3.40	.62	.52	.17	.09	.58	.16	(.07)	.60	.24	(.13)		.23	(.00)	.71	.24	(.01)	.67	.28	(.03)
11. PSWM T4	5.59	.82	.15	.53	.45	.21	.69	.34	.15	.73	.44	.25		.59	.25	.65	.38	.30	.70	.45
12. PSIMM T4	4.90	1.10	(–.03)	.34	.46	(.13)	.36	.49	.18	.50	.56	(.10)	.53		.14	.48	.62	(.12)	.43	.58
13. LMX T5	3.35	.63	.51	.17	.16	.53	.14	.18	.55	.25	.19	.63	.24	.15		.33	(.11)	.78	.29	(.17)
14. PSWM T5	5.60	.76	.22	.48	.43	.19	.61	.35	.19	.62	.41	.26	.69	.36	.27		.56	.30	.65	.45
15. PSIMM T5	5.11	.99	(.07)	.29	.48	.05	.33	.31	(.12)	.48	.53	(.10)	.47	.59	(.09)	.52		(–.06)	.29	.66
16. LMX T6	3.39	.68	.49	.20	(.09)	.54	.18	(.09)	.58	.25	.16	.63	.27	.13	.72	.32	(.01)		.30	(.02)
17. PSWM T6	5.57	.78	.23	.38	.38	.24	.59	.38	.25	.59	.45	.28	.59	.35	.33	.61	.29	.31		.49
18. PSIMM T6	4.94	1.16	(.08)	(.12)	.34	(.02)	.29	.28	.11	.47	.46	(.13)	.41	.52	.18	.32	.61	(.08)	.45	

Note. *Ns* = 207. 206, 201, 209, 210, and 212 (from T1 to T6 at subordinate level); 72, 71, 71, 75, 75, and 75 (from T1 to T6 at leader level). LMX = leader–member exchange; PSWM = perceived subordinate's work motives; PSIMM = perceived subordinate's impression management motives. *M* = mean of subordinate-level variable; and *SD* = standard deviation of subordinate-level variable. Intercorrelations among subordinate-level study variables are shown below the diagonal and intercorrelations among team-level study variables (using group mean scores) shown above the diagonal. Non-significant correlations are in parentheses. Test–retest reliabilities are in bold.

*$p < .05$; **$p < .01$; ***$p < .001$.

Table 6. Means, standard deviation, and correlations for group-II variables (LMX, PLWM, and PLIMM)

Variable	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. LMX T1	3.59	.66		.65	(–.14)	.76	.54	(.08)	.60	.37	(.04)	.61	.48	(.13)	.61	.44	(.06)	.53	.40	(.08)
2, PLWM T1	5.58	1.03	.61		(.07)	.60	.71	.27	.45	.49	(.17)	.47	.58	.24	.50	.55	(.22)	.46	.60	(.20)
3. PLIMM T1	3.99	1.43	(.02)	(.12)		(–.01)	(–.06)	.69	(–.11)	(–.06)	.53	(.02)	(–.02)	.62	(–.20)	(–.06)	.58	(–.07)	(–.06)	.55
4. LMX T2	3.45	.65	.64	.49	(.01)		.61	(.16)	.72	.41	(.10)	.69	.51	(.13)	.63	.40	(.03)	.61	.48	(.12)
5. PLWM T2	5.35	1.06	.49	.58	(.05)	.60		(.06)	.52	.62	(.11)	.53	.71	(.13)	.56	.61	(.04)	.50	.58	(.07)
6. PLIMM T2	4.03	1.34	(.08)	.14	.55	.18	.19		(.09)	(.11)	.69	(.16)	(.12)	.78	.08	(.09)	.66	(.17)	(.15)	.63
7. LMX T3	3.39	.64	.52	.41	(.05)	.58	.42	.17		.53	(.08)	.62	.51	(.12)	.67	.40	(–.02)	.73	.45	(.07)
8. PLWM T3	5.23	1.06	.37	.43	(.08)	.37	.51	.21	.54		.27	.40	.62	.28	.47	.64	(.18)	.44	.57	.25
9. PLIMM T3	4.06	1.31	(.08)	(.13)	.49	(.04)	(.11)	.51	.18	.27		(.18)	(.18)	.76	(–.05)	(.11)	.74	(.09)	(.20)	.68
10. LMX T4	3.40	.62	.52	.38	(.10)	.58	.40	.14	.60	.39	.15		.51	(.16)	.71	.46	(.16)	.67	.48	(.14)
11. PLWM T4	5.18	1.02	.37	.47	(.10)	.43	.52	.14	.49	.58	.24	.51		(.13)	.53	.59	(–.01)	.49	.62	(.18)
12. PLIMM T4	4.14	1.33	.18	.25	.46	(.13)	.17	.55	(.13)	.22	.59	.17	.21		(.02)	(.09)	.72	(.12)	(.10)	.69
13. LMX T5	3.35	.63	.51	.38	(.01)	.53	.42	(.08)	.55	.32	(.04)	.63	.50	(.09)		.62	(–.04)	.78	.56	(–.04)
14. PLWM T5	5.06	1.02	.39	.50	(–.03)	.37	.46	(.11)	.42	.49	.17	.40	.59	.21	.57		(.10)	.50	.66	(.06)
15. PLIMM T5	4.04	1.25	(.02)	.16	.50	(–.01)	(.05)	.50	(.03)	.15	.58	(.04)	(.08)	.61	(–.02)	(.07)		(.08)	(.10)	.66
16. LMX T6	3.39	.68	.49	.39	(.03)	.54	.37	(.12)	.58	.31	(.05)	.63	.46	(.09)	.72	.43	(.01)		.69	(.06)
17. PLWM T6	5.09	1.04	.42	.50	(.03)	.45	.53	(.13)	.44	.55	.15	.42	.62	.17	.48	.64	(.11)	.62		(.11)
18. PLIMM T6	4.10	1.26	(.08)	(.07)	.43	(.04)	(.08)	.38	(.02)	.15	.45	(.11)	.17	.44	(.06)	(.04)	.51	(.11)	.13	

Note. *Ns* = 207. 206, 201, 209, 210, and 212 (from T1 to T6 at subordinate level); 72, 71, 71, 75, 75, and 75 (from T1 to T6 at leader level). LMX = leader–member exchange; PLWM = perceived leader's work motives; PLIMM = perceived leader's impression management motives. *M* = mean of subordinate-level variable; and *SD* = standard deviation of subordinate-level variable. Intercorrelations among subordinate-level study variables are shown below the diagonal and intercorrelations among team-level study variables (using group mean scores) shown above the diagonal. Non-significant correlations are in parentheses. Test–retest reliabilities are in bold.

*$p < .05$; **$p < .01$; ***$p < .001$.

Table 7. Summary of unstandardized parameter estimates in two-level LCS models

Effect	Model 1: X = PSWM; Y = LMX			Model 2: X = PLWM; Y = LMX			Model 3: X = PSIMM; Y = LMX			Model 4: X = PLIMM; Y = LMX		
	Est	SE	p	Est	SE	p	Est	SE	p	Est	SE	p
Between level												
μ_{x0b}: Mean of initial true score of X	5.81***	.07	<.001	5.77***	.08	<.001	5.19***	.11	<.001	3.89***	.16	<.001
μ_{y0b}: Mean of initial true score of Y	3.69***	.06	<.001	3.69***	.06	<.001	3.69***	.06	<.001	3.69***	.06	<.001
μ_{sxb}: Mean of constant change of X	5.65***	.06	<.001	5.47***	.07	<.001	5.12***	.08	<.001	4.04***	.13	<.001
μ_{syb}: Mean of constant change of Y	3.52***	.05	<.001	3.52***	.05	<.001	3.51***	.05	<.001	3.52***	.05	<.001
σ^2_{x0b}: Variance of initial true score of X	0.39***	.07	<.001	.49***	.08	<.001	.91***	.15	<.001	1.82***	.30	<.001
σ^2_{y0b}: Variance of initial true score of Y	0.25***	.04	<.001	.25***	.04	<.001	.25***	.04	<.001	.25***	.04	<.001
σ^2_{sxb}: Variance of constant change of X	0.27***	.05	<.001	.32***	.06	<.001	.43***	.08	<.001	1.11***	.20	<.001
σ^2_{syb}: Variance of constant change of Y	0.19***	.03	<.001	.20***	.04	<.001	.19***	.03	<.001	.20***	.04	<.001
$\beta_{xb}: x_b[t-1] \rightarrow \Delta x_b[t]$	−1.04***	.06	<.001	−1.03***	.10	<.001	−.94***	.07	<.001	−1.01***	.06	<.001
$\beta_{yb}: y_b[t-1] \rightarrow \Delta y_b[t]$	−.89***	.07	<.001	−.84***	.09	<.001	−.83***	.05	<.001	−.97***	.03	<.001
$\gamma_{yxb}: x_b[t-1] \rightarrow \Delta y_b[t]$	−.06	.04	.168	−.09	.06	.099	−.11**	.04	.002	−.01	.03	.611
$\gamma_{xyb}: y_b[t-1] \rightarrow \Delta x_b[t]$	.08	.10	.393	.02	.15	.878	−.10	.11	.341	.01	.07	.901
Within level												
σ^2_{x0w}: Variance of initial true score of X	.16***	.02	<.001	.67***	.07	<.001	.22***	.02	<.001	1.03***	.10	<.001
σ^2_{y0w}: Variance of initial true score of Y	.25***	.02	<.001	.25***	.02	<.001	.25***	.02	<.001	.25***	.02	<.001
σ^2_{sxw}: Variance of constant change of X	.05***	.01	<.001	.31***	.04	<.001	.03***	.01	<.001	.35***	.05	<.001
σ^2_{syw}: Variance of constant change of Y	.11***	.01	<.001	.11***	.01	<.001	.11***	.01	<.001	.11***	.01	<.001
$\beta_{xw}: x_w[t-1] \rightarrow \Delta x_w[t]$	−.76***	.07	<.001	−.90***	.07	<.001	−.85***	.08	<.001	−1.08***	.06	<.001
$\beta_{yw}: y_w[t-1] \rightarrow \Delta y_w[t]$	−.90***	.06	<.001	−.85***	.07	<.001	−.90***	.06	<.001	−.89***	.06	<.001
$\gamma_{yxw}: x_w[t-1] \rightarrow \Delta y_w[t]$	.17*	.08	.035	−.06	.04	.138	.03	.06	.583	.01	.03	.670
$\gamma_{xyw}: y_w[t-1] \rightarrow \Delta x_w[t]$	.20***	.06	<.001	.06	.12	.614	.13	.07	.079	.15	.13	.260

Note:. PSWM = perceived subordinate's work motives; PLWM = perceived leader's work motives; PSIMM = perceived subordinate's impression management motives; PLIMM = perceived leader's impression management motives; and LMX = leader–member exchange.
*$p < .05$; **$p < .01$; ***$p < .001$.

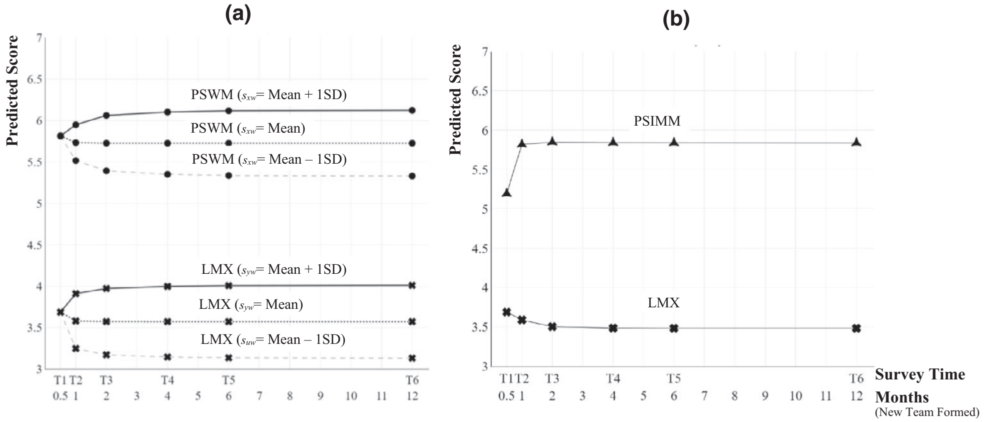

Figure 4. Predicted Trajectory of Various Motives and LMX Over Six Waves. *Note:* PSWM = perceived subordinate's work motives; LMX = leader–member exchange; PLWM = perceived leader's work motives; PSIMM = perceived subordinate's impression management motives; and PLIMM = perceived leader's impression management motives. Initial true scores and constant change components of study variables at between level and within level are kept at their mean value, unless specified otherwise.

$SRMR_{Within} = .06$). The means of the between-level constant change parameters of PSWM ($\mu_{sxb} = 5.65, p < .001$) and LMX ($\mu_{syb} = 3.52, p < .001$) were positive. The proportional change parameters were negative at the between level ($\beta_{xb} = -1.04, p < .001$ for PSWM; $\beta_{yb} = -0.89$, $p < .001$ for LMX) and within level ($\beta_{xw} = -0.76$, $p < .001$ for PSWM; $\beta_{yw} = -0.90$, $p < .001$ for LMX). In terms of coupling effects, we observed a positive within-level coupling effect of PSWM at $t - 1$ on the latent difference scores of LMX at t ($\gamma_{yxw} = 0.17, p < .05$), as well as a positive coupling effect from LMX at $t - 1$ to change in PSWM at t ($\gamma_{xyw} = 0.20$, $p < .001$). The presence of such positive coupling effects of PSWM and LMX on each other at the within level provides support for H1.[7]

Figure 4a visualizes the dynamics between PSWM and LMX. The dotted line denotes the trajectory of PSWM and LMX over time when the value of the within-level constant change components of PSWM and LMX is at the mean (= 0, because $s_{xw} = \mu_{sxw} = 0$; $s_{yw} = \mu_{syw} = 0$). In Figure 4a, a slight decline of PSWM and LMX at a decreasing rate can be seen, both of which levelled off and stabilized after T3 and beyond. To illustrate the impact of the positive coupling effects at the within level, we adjusted the value of the within-level constant change components; otherwise, the latent difference scores would always be zero due to the zero values of those components. When the values of PSWM and LMX

[7] *In the interpretation of the constant change component, Jacobucci, Serang, and Grimm (2019) warn that when the correlation between the mean of the constant change parameters (μ_{sxb}, μ_{syb}) and the proportional change parameters (β_{xb}, β_{yb}) is as high as ± 1, it is not possible to interpret each component of change as distinct and independent. This is a potential limitation of the LCS model. From the variance–covariance matrix of the parameter estimates, the correlations of the mean of the constant change parameter of PSWM (μ_{sxb}), with the parameters of proportional change (β_{xb}, β_{yb}) and of the coupling effect (γ_{yxw}, γ_{xyw}), were as low as –.020, –.001, –.003, and –.005. Likewise, the correlations of the mean of the constant change parameter of LMX (μ_{syb}) with the corresponding four parameters were trivial, lying between –.017 and –.001. To examine the correlations among within-level parameters, we reran the model with the means of the within-level constant change parameter (μ_{sxw}, μ_{syw}) freely estimated (but not fixed to zero) and the fit indices were virtually unchanged. The results showed that the correlations of μ_{sxw} and μ_{syw} with β_{xb}, β_{yb}, γ_{yxw}, and γ_{xyw} were negligible, ranging between –.002 and .007. This implies that the mean of the constant change parameters was independent from the parameters of the proportional changes and coupling effects, and so does not undermine our interpretation of the results.*

are set at their low value (mean-1SD; i.e., $s_{xw} = \mu_{sxw} - \sqrt{\sigma^2_{sxw}} = -.22$; $s_{yw} = \mu_{syw} - \sqrt{\sigma^2_{syw}} = -.33$), the corresponding trajectory is presented on a dashed line; it can be seen that PSWM and LMX fell at a decreasing rate and held steady after T3 and onward. When the values of PSWM and LMX are set at their high value (mean + 1SD; i.e., $s_{xw} = .22$; $s_{yw} = .33$), the trajectory is denoted by the solid line in which PSWM and LMX increased at a decelerating rate and virtually stopped climbing after T3 and thereafter.

Lagged effect of leader's perceived work motives on change in LMX

We tested H2 using Model 2 by setting PLWM as variable *X* and LMX as variable *Y*. The fit was acceptable ($\chi^2(134) = 255.10$, $p < .001$, RMSEA = .07; CFI = .94; TLI = .94; $\text{SRMR}_{\text{Between}} = .06$; $\text{SRMR}_{\text{Within}} = .06$). The means of the (between level) constant change of PLWM ($\mu_{sxb} = 5.47, p < .001$) and LMX ($\mu_{syb} = 3.52, p < .001$) were positive, while the proportional changes at the between level ($\beta_{xb} = -1.03, p < .001$ for PLWM; $\beta_{yb} = -0.84$, $p < .001$ for LMX) and within level ($\beta_{xw} = -0.90$, $p < .001$ for PLWM; $\beta_{yw} = -0.85, p < .001$ for LMX) were negative. However, as no coupling effects were present, H2 was not supported.[8]

Lagged effect of subordinate's perceived IM motives on change in LMX

To test H3, PSIMM was set as variable *X* and LMX as variable *Y*. The fit of Model 3 to the data was plausible ($\chi^2(138) = 285.65$, $p < .001$; RMSEA = .07; CFI = .88; TLI = .88; $\text{SRMR}_{\text{Between}} = .09$; $\text{SRMR}_{\text{Within}} = .06$), except for CFI and TLI that diverged very slightly from the traditional threshold of .90. The between-level constant change means were positive for PSIMM ($\mu_{sxb} = 5.12$, $p < .001$) and LMX ($\mu_{syb} = 3.51$, $p < .001$). The proportional changes were negative at the between level ($\beta_{xb} = -0.94$, $p < .001$; $\beta_{yb} = -0.83, p < .001$) and within level ($\beta_{xw} = -0.85, p < .001; \beta_{yw} = -0.90, p < .001$). A between-level coupling effect from PSIMM at $t - 1$ to change in LMX at t was negative ($\gamma_{yxb} = -0.11$, $p < .005$), therefore lending support to H3.[9] However, no within-level coupling effects were found. Combined with a negative between-level coupling effect, the trajectories of PSIMM and LMX over six waves are depicted in Figure 4b by setting the constant change estimates at their mean values (i.e., $s_{xb} = \mu_{sxb}$; $s_{yb} = \mu_{syb}$; $s_{xw} = \mu_{sxw} = 0$; $s_{yw} = \mu_{syw} = 0$). As shown in Figure 4b, the score of PSIMM increased with time from T1 at a decreasing rate, then stopped climbing at T3, and remained virtually constant thereafter. LMX showed an opposite trajectory to that of PSIMM, declining from T1 at a reducing rate and then remaining nearly invariant with time after T3 and onward.

Lagged effect of leader's perceived IM motives on change in LMX

To test H4, Model 4 incorporated the variables PLIMM and LMX. Model adequacy can be considered acceptable ($\chi^2(134) = 259.99, p < .001$; RMSEA = .07; CFI = .92; TLI = .92; $\text{SRMR}_{\text{Between}} = .05$; $\text{SRMR}_{\text{Within}} = .07$). Likewise, the means of constant change were positive ($\mu_{sxb} = 4.04$, $p < .001$; $\mu_{syb} = 3.52$, $p < .001$) and the proportional change

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[8] *The correlations of μ_{sxb} and μ_{syb} with other key parameters (β_{xb}, β_{yb}, γ_{yxb}, and γ_{xyb}) were between −.017 and .001. Having allowed μ_{sxw} and μ_{syw} to freely estimate, correlations with key parameters at the within level (β_{xb}, β_{yb}, γ_{yxb} and γ_{xyb}) ranged from .001 to .006. Again, these minimal correlations do not undermine the interpretation of results.*

[9] *The correlations of the means of constant change with key parameters lay from −.022 to .001 at the between level and from −.001 to .006 at the within level.*

coefficients were negative ($\beta_{xb} = -1.01, p < .001; \beta_{yb} = -0.97, p < .001; \beta_{xw} = -1.08, p < .001; \beta_{yw} = -0.89, p < .001$). There were no non-zero coupling effect parameters at either level. Thus, H4 is not supported.[10]

Discussion

Based on attribution theory, this study examined the effect of both subordinates' and leaders' perceived work and IM motives on the development of LMX over time for newly formed teams. Four key results have emerged. First, when leaders perceive subordinates as having higher work motives than the group average, they are likely to develop a higher quality LMX. Second, better-than-average LMX[11] between a leader and a particular subordinate within a group at time $t - 1$ is likely to bolster that subordinate's PSWM at time t once the latent individual difference and the level of PSWM at time $t - 1$ are taken into account. While PSWM influenced LMX positively over time, PSWM could also be heightened by a good LMX in return. Third, for H3 at the team level, the overall level of PSIMM was negatively associated with the LMX across the entire team. Leaders who perceive their subordinates as having IM motives at time $t - 1$ tend to develop low LMX compared to leaders who do not form such strong perceptions at time t. Lastly, neither PLWM nor PLIMM (H2 and H4) significantly affected LMX or *vice versa*. This unexpected result might imply that the role of subordinates' perceptions of leaders' work/IM motives is less important to LMX development. Although the current literature emphasizes the importance contributions from both leaders and subordinates, the question of who takes the more critical role in LMX development remains unresolved. Given our findings that leaders' perceptions of subordinates' motives had an impact on LMX in newly formed teams, we may conclude that leaders seem to take a more significant role in determining LMX.

Kozlowski and Klein (2000) have called for increased attention to multilevel issues in the LMX literature. Our two-level analysis has provided clarity on the level at which each of the two perceived motives operates. The effect of PSWM is seen at the subordinate level, while the effect of PSIMM occurs at the team level. We suggest that leaders may find those subordinates who are perceived as genuinely working for the whole team (strong work motives) to be the 'good soldiers', thereby developing a higher LMX. However, leaders' perceptions might have some degree of bias. For example, leaders with 'Theory *X*' (compared to 'Theory *Y*') management beliefs might be more likely to form such perceptions regardless of the actual behaviour/motives of their subordinates. Leaders with a 'Theory *X*' perspective are likely to think that most of their subordinates are driven by IM rather than work motives; conversely, leaders with a 'Theory *Y*' approach tend to perceive their subordinates as driven by work motives, according to implicit followership theories (Lord, Epitropaki, Foti, & Hansbrough, 2020).

Theoretical contributions

First, our study contributes to the existing LMX literature by exploring the influence of the dynamic processes of perceived work and IM motives on LMX development over

[10] *The correlations of the means of constant change with the key parameters were from −.035 to .001 at the between level and from .001 to .008 at the within level.*

[11] *Better-than-average LMX means an LMX score describing the quality of the relationship between a team leader and a specific subordinate who is outperforming the other subordinates in the same team.*

time in newly formed teams. Previous studies have proposed from a theoretical perspective that perceived work and IM motives will affect LMX (Dasborough & Ashkanasy, 2002; Dienesch & Liden, 1986). Similarly, Lam et al. (2007) integrate leaders' assessments of subordinates' motives into their research on the relationship between feedback-seeking behaviour and LMX, finding that different perceptions enhance or weaken the effect of such behaviour on LMX development. Although LMX has always been conceptualized as a dyadic relationship determined by both leaders and subordinates, most empirical research on LMX quality has focused on the role of one of the parties (Dulebohn, Bommer, Liden, Brouer, & Ferris, 2012). Using the LCS model (Ferrer & McArdle, 2010; McArdle, 2009), we have shown that PSWM was positively associated with LMX at the subordinate level, and while PSWM influences LMX positively over time, it can be heightened by a good LMX in return. Thus, we contribute to the LMX literature by integrating both leaders and subordinates' perspectives on the dynamic process of developing high-quality LMX.

Second, our results have showed that both individual- and team-level PSWM, individual-level PSIMM, and LMX in general, are not stable, while team-level PSIMM is more so. Given the flexibility of perceived motives and LMX, PSWM fosters subordinate-rated LMX, while PSIMM damages LMX. Also, PSIMM (compared to the other variables) seems to reflect leaders' more fixed attitudes or dispositions rather than perceptions of their subordinates. In this study, the beneficial (detrimental) effect of subordinates' perceived work (IM) motives on LMX was observed over six measurement occasions lasting for a year in total. This suggests test–retest reliability and stability of the results since formation of the new teams.

Methodological contributions

Maslyn and Uhl-Bien (2001) examine the relationship between effort and LMX using a cross-sectional study, and Nahrgang et al. (2009) address within-group LMX differences for only the first 8 weeks after formation of leader–subordinate dyads. To overcome the cross-sectional methodological limitation in the former study, and to make the timespan much broader than in the latter, we have used a six-wave design spanning from 2 weeks (T1) to 1 year (T6) after the leader–member dyads had been established. The use of LCS model has enabled us to evaluate the impact of perceived motives (at time $t - 1$) on LMX (at time t) by controlling for LMX at time $t - 1$ using the proportion change effect.

This procedure has allowed us to produce more accurate results. Previous research suggests that LMX develops very quickly, within 2 weeks to 2 months of the initial interaction, and then stabilizes (Graen & Uhl-Bien, 1995; Liden et al., 1993). Our findings confirm these results by indicating that by around 2 months (i.e., Time 3 survey in this study) after formation, mutual perceptions all appeared to level off and maintain stable. This suggests that while first impressions are always important, interpretations of another party's IM motives can change during the interaction process, along with variations in LMX.

Exchange relationships develop gradually, starting from the initial perception of work and IM motives (Graen & Uhl-Bien, 1995; Lam et al., 2007). We used different intervals between the six waves of data collection. According to Sparrowe and Liden (1997), behaviour during the initial interaction between leader and subordinate may have immediate implications for the nature of the exchange. Thus, the initial period is important in LMX development, and we should pay more attention to it. Liden et al. (1993) point out that LMX quality has been shown to stabilize by 6 months into the relationship.

Accordingly, for this research we collected data over six waves of surveys[13] to determine the process of LMX development.

Practical contributions

Mutual perceptions of the motives of each other's behaviour, from initial stages to ongoing development, are antecedents of LMX. This logic could help both leaders and subordinates improve their relationships and may also extend to developing good relationships with coworkers and customers.

Leaders and subordinates should also pay attention to perceptions of the first impressions they give. Initial attributions are related to initial LMX and continue to influence how it develops over time. This result was especially pertinent for subordinates, as our results did not show an association between leaders' perceptions of their IM motives and LMX. Several other studies acknowledge the importance of the initial stage of LMX (Bauer et al., 1996; Liden et al., 1993; Nahrgang et al., 2009), consistent with the adage, 'You never get a second chance to make a first impression'. If subordinates want to establish high-quality relationships with their leaders, they should try extra hard to foster positive perceptions of their work motives by their leaders in the early stages of team development.

Both leaders and subordinates should also be careful about how they perceive the other party's motives. Perceiving the other's efforts as driven by IM motives, or being self-serving (Grant, Parker, & Collins, 2009) not only prevents people from getting credit for their efforts but also destroys LMX and even has a detrimental effect on work outcomes (Dulebohn et al., 2012).

Limitations

First, we did not include supervisors' perceptions of LMX in our research model. Sin, Nahrgang, and Morgeson (2009) point out that empirically, leader-rated LMX does not match subordinate-rated LMX and so might be driven by different mechanisms. In this study, we have explored factors related to improving LMX quality by using subordinate-rated LMX. However, using both leader- and subordinate-rated LMX would help to strengthen the conclusions of this study.

Second, we used a traditional LMX-7 approach (Graen & Uhl-Bien, 1995), which means we cannot identify the impact of attributions on specific aspects of LMX. Perceptions of what motivates the other party may influence some, but not all, LMX dimensions. Measuring LMX using the LMX-MDM scale (Liden & Maslyn, 1998) that captures four distinct dimensions (affectivity, loyalty, professional respect, and contributory behaviour), or social and economic LMX (Buch, Kuvaas, & Dysvik, 2019; Kuvaas & Buch, 2018) may provide a more fine-grained explanation of its association with how motives are perceived. Third, although we used a six-wave longitudinal design and obtained information from different sources, the subordinate-rated measures of leaders' motives and LMX may still suffer from common method variance, even though our CFA results may reduce this concern.

[13] *During the first 6 months after the new teams had formed, we collected data frequently (i.e., five waves) and more often during the first 2 months (i.e., three waves). We collected the sixth and last wave 6 months after the fifth wave of data had been collected in order to understand the further development of LMX over time.*

Research directions

We hope future research will consider how leaders' and subordinates' characteristics and behaviour, as well as contextual variables, contribute to the formation, development, maintenance, and decline of LMX. Previous studies indicate that LMX is influenced by various traits and behaviours in leaders and subordinates (Dulebohn et al., 2012; Liden et al., 1993). Unfortunately, the cross-sectional limitations of most LMX research have made it difficult to identify causal relationships or to distinguish the various factors influencing different LMX stages. Other possible antecedents and boundary conditions need to be identified and empirically examined. Several researchers have pointed out that the differential treatment of team members by their leader is at the heart of LMX theory (Harris, Li, & Kirkman, 2014; Blanc, & González-Romá, 2012). Studies have also found that LMX differentiation could interact with LMX to influence individual OCB and turnover intention, team performance, and so forth. However, empirical studies exploring the role of within-team LMX differentiation in relation to team outcomes are still relatively scarce. Future research may use longitudinal data to explore how effort and attribution influence LMX differentiation from both leaders' and subordinate's perspectives. Another possible research direction could address the interactions of multiple motives in predicting LMX. It seems reasonable to suggest that managers and subordinates could possess both work and IM motives simultaneously. We therefore encourage researchers to join the debate on the effects of the interactions between different motives, and to examine whether they detract from or reinforce each other in predicting behaviour (Grant & Mayer, 2009).

Conclusion

Inherent in the concept of LMX is the centrality of 'two-to-tango' exchanges in a leader–member relationship. This research has primarily echoed Antonakis' (2017) call for the replication pf leadership studies in general and Maslyn and Uhl-Bien's (2001) call for the use of longitudinal design to address the process of how perceived dyadic effort motives are involved in LMX development. We have answered this call by plotting the trend of changes in the quality of LMX, from initial formation to a year later, using a six-wave longitudinal design and LCS models to test our predictions. Our findings thereby offer theoretical, methodological, and practical implications for understanding and developing high-quality LMX in organizations over time from the formation of new teams.

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Conflicts of interest

All authors declare no conflict of interest.

Author contribution

Ziguang Chen (Conceptualization; Funding acquisition; Supervision; Writing – review & editing) Yuanyuan Huo (Writing – original draft; Writing – review & editing) Wing Lam (Conceptualization; Funding acquisition; Methodology; Writing – original draft) Roger Chun-To Luk (Formal analysis; Methodology; Software; Writing – review & editing) Israr Qureshi (Methodology; Writing – original draft).

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