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Team Knowledge Exchange:

How and When Does Transformational Leadership Have an Effect?

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Abstract

In this study, we examined how and when transformational leadership affected team knowledge exchange. Taking a goal pursuit perspective, we hypothesized two parallel mediating mechanisms—team knowledge goal generation and team knowledge goal striving—linking transformational leadership to team knowledge exchange. In addition, we investigated whether team-level team-member exchange served as a boundary condition that qualified the effects of transformational leadership on team knowledge goal generation and striving. We tested our hypotheses using time-lagged data from 118 work teams of a large Chinese manufacturing firm. Our findings provided support for the proposed parallel mediating mechanisms (i.e., team knowledge goal generation and team knowledge goal striving) that linked transformational leadership to team knowledge exchange. In addition, we found that team-level team-member exchange could strengthen the positive effect of transformational leadership on team knowledge exchange via team knowledge goal generation. By taking the novel lens of team goal pursuit, this study contributes to the literature on leadership and teams by shedding light on how transformational leadership triggers the goal pursuit process of team knowledge exchange.

Keywords: transformational leadership, team knowledge exchange, team knowledge goal generation, team knowledge goal striving, team-member exchange

Team Knowledge Exchange:

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Team knowledge exchange refers to the process whereby team members retrieve their individual knowledge and share it with each other via open discussion and documentation (Jiang & Chen, 2018; Srivastava, Bartol, & Locke, 2006). Making individual knowledge available to others within the team can be beneficial (Argote & Fahrenkopf, 2016). In particular, as teams are typically formed to benefit from the diverse knowledge reservoirs of different individuals through knowledge dissemination and integration, team knowledge exchange constitutes an important team process goal (i.e., team goal that focuses on enhancing the process/means through which teams achieve desired outcomes, such as high performance; Zimmerman & Kitsantas, 1997, 1999) that enables teams to achieve high performance (Dreu, Nijstad, & Van Knippenberg, 2008; Hinsz, Tindale, & Vollrath, 1997; Nijstad & Dreu, 2012). In this regard, knowledge exchange is critical because it allows team members to develop a shared understanding regarding team tasks and responsibilities, transfer complex knowledge from one to another, and build up a team-level knowledge architecture about who knows what (Argote & Ingram, 2000; Wegner, 1986, 1995; Wegner, Erber, & Raymond, 1991). Relatedly, prior research has shown that knowledge exchange among team members can promote individual creativity (Dong, Bartol, Zhang, & Li, 2017), facilitate team innovativeness (Černe, Nerstad, Dysvik, & Škerlavaj, 2014), and increase team task performance (Hajro, Gibson, & Pudelko, 2017).

Despite its importance for team outcomes, team knowledge exchange does not unfold automatically; rather, it is a process that hinges on the collective motivation to set and pursue knowledge exchange-related goals. Investing time and effort into using and integrating each other's knowledge is typically expected from team members, but teams are ultimately rewarded for the achievement of defined outputs, for example, increased numbers of high-

quality and non-defective products (Ethiraj & Levinthal, 2009). The organizational reality is that teams need to produce these outputs with constrained time and resources. Teams might thus be inclined to limit the sharing, discussion, and integration of available knowledge to a minimum and rather draw upon established procedures and routinized execution of tasks (Akgun, Lynn, & Byrne, 2006; Gersick & Hackman, 1990). As a result, teams may fail to fully leverage knowledge-related benefits through knowledge exchange. Consequently, how to promote team knowledge exchange becomes a critical question that deserves research attention.

As we know, team leaders play a critical role in influencing team knowledge exchange (Burke et al., 2006; Srivastava et al., 2006). For example, leaders can facilitate team knowledge exchange by connecting team members with different knowledge reservoirs (Burmeister et al., 2015) and developing an open learning environment that fosters the exchange of valuable knowledge (Oddou et al., 2013). In particular, transformational leadership, as an important team ambient input, can provide attitudinal, informational, and behavioral cues that inform team members about expected and appropriate behaviors (Chen & Kanfer, 2006), and thus should be particularly relevant to team knowledge exchange. Supporting this argument, Dong et al. (2017) found that transformational leadership was positively associated with team knowledge exchange. In addition, Jiang and Chen (2018) found that transformational leadership promoted team knowledge exchange via the mediation of team cooperation.

As team knowledge exchange is a team process goal that hinges on the collective motivation of the team (Dreu et al., 2008; He, Baruch, & Lin, 2014; Hinsz et al., 1997; Wang & Noe, 2010), we propose that one central mechanism for team leaders to shape team knowledge exchange is via the motivational process. Transformational leaders are particularly influential for increasing the collective motivation of team knowledge exchange because they "change the basic values, beliefs, and attitudes of followers so that they are willing to perform

beyond the minimum levels specified by the organization" (Podsakoff, MacKenzie, Moorman, & Fetter, 1990, p. 108). Simply put, transformational leaders, who provide a compelling vision of continuous improvement, establish high performance expectations that go beyond established routines, challenge their followers intellectually, and provide the support needed, should be able to facilitate collective motivation for team knowledge exchange.

In light of the team motivational perspective, we take a team goal pursuit approach to articulate how and when transformational leadership facilitates team members to direct their efforts toward team knowledge exchange. Guided by Chen and Kanfer (2006), we propose that transformational leadership, as a team ambient input, motivates team members to engage in knowledge exchange via team knowledge goal generation (i.e., deciding where to allocate team effort and developing strategies to reach knowledge-related goals) and team knowledge goal striving (i.e., regulating and sustaining collective action to attain knowledge-related goals). Further, we examine team-level team-member exchange (TMX; Seers, 1989), an indication of the general level of relational quality and reciprocity within the team (Seers, Petty, & Cashman, 1995), as an important boundary condition to qualify the influence of transformational leadership on team knowledge goal pursuit. This is important because team-level goal pursuit, in contrast to individual-level goal pursuit, depends on reciprocated collective efforts of interactive team members who need to reach consensus to pursue collective goals (Chen & Kanfer, 2006; Kamdar & van Dyne, 2007). Team-level TMX should enable team members to build rapport with each other through high-quality and reciprocated interactions, such that they are more effective in translating the transformational inputs by their leaders into collective knowledge goal pursuit.

Our study contributes to the literature in two major ways. First, we provide a novel lens to understand the underlying motivational mechanisms through which leaders impact team knowledge exchange. Specifically, when explicating the specific goal pursuit

mechanisms linking transformational leadership to team knowledge exchange, we consider two parallel motivational processes at the team level: team knowledge goal generation and team knowledge goal striving based on Chen and Kanfer (2006). Accordingly, goal generation and goal striving represent two interrelated motivational components that enable teams to direct, regulate, and sustain their collective effort. In our study, we apply this conceptualization to the context of team knowledge exchange, and depict how transformational leadership, as a team ambient input, triggers this team motivational goal pursuit process. By controlling for the mediating effect of team cooperation, the behavioral mechanism established by Jiang and Chen (2018), we are able to empirically test whether team knowledge goal pursuit mechanisms provide additional explanatory power for the linkage between transformational leadership and team knowledge exchange beyond team cooperation. In this way, our study not only contributes to the literature on leadership as an antecedent of team knowledge exchange, but also furthers our understanding about the exact ways in which collective motivation furthers team knowledge exchange.

Second, taking a step further, we investigate team-level TMX as an important boundary condition that shapes the effects of transformational leadership on team knowledge goal generation and striving. Focusing on team-level TMX allows us to distinguish team goal pursuit processes from individual goal pursuit processes. This is because team-level goal pursuit processes rely on the reciprocated efforts among team members, which is essential for achieving collective consensus and relational coordination in team goal pursuit (Chen & Kanfer, 2006; Kamdar & van Dyne, 2007). Accordingly, team-level TMX represents an important team context variable that shapes how team members, as a collective, respond to team leader behavior by engaging in team knowledge goal pursuit (Chun, Cho, & Sosik, 2014). In addition, examining moderators of transformational leadership has also been called for by leadership contingency research (Rosing, Frese, & Bausch, 2011; Wu & Wang, 2015), because such an investigation can advance our knowledge about the conditions for

transformation leadership to take effect. We present our hypothesized research model in Figure 1.

Insert Figure 1 about here

Team Knowledge Goal Pursuit Perspective

The team knowledge goal pursuit perspective that we advance in this study to explain how and when transformational leadership leads to team knowledge exchange is based on the team motivation theory by Chen and Kanfer (2006). In this theory, Chen and Kanfer (2006) explain the team motivational processes through which team ambient inputs (e.g., leadership) are translated into performance-related team outputs. They specify team goal generation and team goal striving as central team motivational processes that enable teams to direct, manage, and sustain effort toward team goals. In particular, teams, like individuals, can identify meaningful goals and strive to achieve these goals (Marks, Mathieu, & Zaccaro, 2001). As knowledge exchange is an important team process goal, team members, as a collective, may engage in team knowledge goal generation as well as team knowledge goal striving. In turn, we argue that team knowledge goal pursuit facilitates the achievement of desired team outcomes such as team knowledge exchange.

In developing their theory of team motivation, Chen and Kanfer (2006) acknowledge the functional similarity of constructs and relationships that underlie motivational goal pursuit processes at the individual and team level; however, they are specific in highlighting the added complexity in team- versus individual-level motivational processes. In particular, teams (vs. individuals) need to achieve consensus and relational coordination to pursue goals because "the identification of operational goals and the processes by which the team accomplishes those goals typically occurs through the collective and coordinated actions of team members" (Chen & Kanfer, 2006, p. 231). For example, the team goal pursuit process requires team members to come to consensus with regard to the collective goals that they aim

to pursue and coordinate their effort through reciprocated interactional processes (Rico, Sanchez-Manzanares, Gil, & Gibson, 2008). Considering the important roles of relationship quality and member reciprocity in team goal pursuit, we position team-level TMX as an important boundary condition that shapes team goal pursuit by impacting the social processes of collective interactions among team members (Rico et al., 2008; Seers, 1989). Specifically, in a team environment that is characterized by high team-level TMX, teams are more likely to translate transformational leader behavior into team knowledge goal pursuit. This is because team members are more effective in translating collective knowledge exchange goals into related goal generation and striving behaviors based on their experience of how to build rapport with each other through effective social exchanges. Thus, in this study, we incorporate team-level TMX as an important contingency factor that shapes the effects of transformational leadership on team knowledge goal pursuit processes.

Hypotheses Development

Transformational leadership is a multidimensional construct and can be defined in terms of the key behaviors that leaders engage in (Podsakoff et al., 1990). First, transformational leaders identify new opportunities and inspire followers, set an example for employees to follow, and promote cooperation among employees and the acceptance of collective goals (i.e., core transformational behaviors). Second, transformational leaders expect excellence and set high standards for performance (i.e., high performance expectations). Third, leaders who enact transformational leadership provide individualized support to their followers by taking their needs into account (i.e., individualized support). Fourth, transformational leaders provide intellectual stimulation by challenging followers to rethink how work can be performed (i.e., intellectual stimulation). Due to the high correlations among the four dimensions, most researchers have combined the dimensions to study the effect of a higher-order transformational leadership factor (Van Knippenberg &

Sitkin, 2013), and meta-analytic evidence has supported the validity of such a transformational leadership construct (e.g., Judge & Piccolo, 2004).

Transformational Leadership, Team Knowledge Goal Pursuit, and Team Knowledge Exchange

We propose that transformational leaders can promote team knowledge goal generation because they channel the collective motivation of the team toward team knowledge exchange-related goals. First, transformational leaders convey high performance expectations toward their team members and expect them to go above and beyond their job responsibilities (Bass & Riggio, 2006; Podsakoff et al., 1990). Team members are thus encouraged to identify ways to develop their full potential and continuously improve their performance in addition to getting their work done (Dong et al., 2017; Dvir, Eden, Avolio, & Shamir, 2002). As the sharing and integration of new knowledge enables teams to optimize their work processes and routines (Akgun et al., 2006; Gersick & Hackman, 1990), team members are particularly motivated to generate team knowledge exchange goals to live up to the high performance expectations of their transformational leaders. Second, transformational leaders stimulate their team members' intellectual curiosity and provide them with support for self-directed actions, such that their confidence to take on challenging tasks that contribute to team effectiveness is facilitated (Parker & Wang, 2015; Strauss, Griffin, & Rafferty, 2009). As team knowledge exchange represents a challenging cognitive task that requires team members to retrieve their knowledge from memory and communicate it to others in understandable ways (Grand, Braun, Kuljanin, Kozlowski, & Chao, 2016), transformational leader behaviors should be particularly relevant for the generation of knowledge exchange-related team goals.

We further propose that transformational leaders can facilitate team knowledge goal striving by increasing the possibility and attractiveness of achieving team knowledge exchange goals (Hollenbeck & Klein, 1987; Salancik, 1977), thereby energizing their teams to direct effort toward knowledge exchange. First, transformational leaders can enhance the

attractiveness of team knowledge exchange goals by publicly encouraging knowledge exchange and setting up these goals as an inspiring vision for the team. As goals are perceived more attractive to pursue when they are publicly known and recognized by significant others (Hollenbeck & Klein, 1987; Seijts, Meertens, & Kok, 1997), team members may be motivated to invest energy into team knowledge goal striving. Second, in addition to developing an inspiring vision for the future and portraying high performance expectations, transformational leaders foster ties with followers and offer them assistance during goal attainment, thereby creating further support for their vision (Bass & Riggio, 2006; House, 1977; Podsakoff et al., 1990). Support from transformational leaders is particularly relevant for team knowledge exchange because many communication-related difficulties, such as misunderstandings, may emerge during knowledge exchange and need to be overcome (Burmeister et al., 2015). Accordingly, the individualized support provided by transformational leaders contributes to a safe learning environment, where followers of transformational leaders are more likely to perceive collective goals, such as team knowledge exchange, to be realistic and achievable (Ilies, Judge, & Wagner, 2006). Taken together, we hypothesize:

> **Hypothesis 1a.** *Transformational leadership is positively related to team knowledge goal generation.*

> **Hypothesis 1b.** *Transformational leadership is positively related to team knowledge goal striving.*

In turn, we propose that both team knowledge goal generation and team knowledge goal striving facilitate team knowledge exchange. We argue that team knowledge goal generation can facilitate team knowledge exchange because it directs collective attention and energy toward team knowledge exchange and facilitates the development of concrete action plans. First, teams that have invested cognitive efforts into envisioning team knowledge exchange as a salient and attractive collective goal (Bindl, Parker, Totterdell, & Hagger-Johnson, 2012; Grant & Ashford, 2008) are more likely to direct their attention and effort

toward team knowledge exchange (Montani, Odoardi, & Battistelli, 2015). Second, teams that have generated a concrete collective goal are more likely to engage in preparatory actions by creating detailed plans and mentally simulating appropriate strategies to achieve their goal (Chen & Kanfer, 2006). As planning and simulating how to achieve collective goals has been shown to facilitate collective goal attainment (Tesluk & Mathieu, 1999), we expect that team knowledge goal generation is positively related to team knowledge exchange.

In addition, we argue that team knowledge goal striving can facilitate team knowledge exchange because it supports the development and revision of knowledge exchange strategies. Team goal striving involves the investment of time and effort into actions that facilitate the achievement of collective goals and reflection on successful and unsuccessful approaches to potentially adapt the goal striving strategy (Bindl et al., 2012; Parker & Wang, 2015). When team members strive for the knowledge exchange goal, they are more willing to invest effort into understanding specialized knowledge from team members and developing appropriate strategies to effectively transfer knowledge to others, thereby facilitating knowledge retrieval, communication, and aggregation. In addition, knowledge exchange is a demanding and iterative process that benefits from reflecting on successful and unsuccessful attempts so as to adapt the knowledge transfer strategy in a timely manner (Burmeister et al., 2015). As such, teams that engage in reflecting on their attainment of knowledge exchange goals (Bindl et al., 2012; Parker & Wang, 2015) might be more effective because they can develop more appropriate strategies for knowledge exchange. For example, through a reflection process, teams may realize that visualizing team members' knowledge can be an effective approach to spark discussions and encourage knowledge transfer, and thus make this approach a formalized knowledge transfer strategy. We thus hypothesize:

> **Hypothesis 2a.** *Team knowledge goal generation is positively related to team knowledge exchange.*

Hypothesis 2b. Team knowledge goal striving is positively related to team knowledge exchange.

The Moderating Role of Team-Level Team-Member Exchange

Team-level TMX reflects the general level of reciprocity of members within the team (Seers et al., 1995) and emerges when team members are in agreement with regard to the general level of positive reciprocity during social interactions. As such, team-level TMX captures the relational quality among team members (Chun, Cho, & Sosik, 2016; Dasborough, Ashkanasy, Tee, & Tse, 2009; Seers et al., 1995). TMX emerges at the team level because the ongoing reciprocation of ideas, feedback, recognition, and mutual assistance among team members creates an environment in which high-quality social exchanges become the norm, thus aligning enactment and perceptions of relationship quality and member reciprocity within the team. In the team knowledge goal pursuit process, TMX represents an important team context that informs the interpersonal climate and social exchange process. In particular, teams with high levels of TMX create safe and positive interpersonal contexts in which reciprocation, characterized by mutual care and ample psychosocial support (Liu, Loi, & Lam, 2011), is a core feature of the team (Flynn, 2005).

We argue that team-level TMX can amplify the positive influence of transformational leaders on team knowledge goal generation because high quality of social interactions within the team facilitates alignment with regard to the direction of the team's efforts during the collective goal generation process. With high-quality TMX, team members are more likely to build rapport with each other and reach consensus about translating the vision from transformational leaders into actionable goals (Bass, 1985; Moriano, Molero, Topa, & Lévy Mangin, 2014). For example, in teams in which the overall relationship is conducive to assisting others and sharing ideas and feedback (Liu et al., 2011), team members are more likely to jointly interpret transformational leader behaviors as an invitation to envision and plan team knowledge goals. In addition, teams that are characterized by high-quality TMX are

more effective in anticipating the possible challenges and developing feasible plans during team knowledge goal generation, as team members are used to and therefore skillful in giving, receiving, and implementing feedback for self-improvement in different work situations (Tse, 2014). To contrast, teams with low-quality TMX are likely to limit their social exchanges to a minimum, which can inhibit the mutually reinforcing interactions that are necessary to translate the inputs of transformational leaders into actionable steps for team knowledge goal generation.

We also expect TMX to strengthen the positive relation between transformational leadership and team knowledge goal striving. As a collective rather than an individual goal, team knowledge exchange may not be sufficiently attractive to individual team members, because they need to sacrifice their time and resources to contribute to the collective knowledge pool, which may be even misaligned with their individual goals. In this context, team-level TMX is particularly important because the positive reciprocity in social interactions creates social pressure that encourages collective goal striving by heightening team members' feelings of obligation with regard to knowledge exchange. For example, team members who have benefitted from the caring, safe, and supportive social interactions feel accountable to their team members and are more likely to reciprocate by focusing their attention and effort on collective goal attainment. As a result, transformational leaders can have a stronger effect on team knowledge goal striving in teams characterized by high TMX because team members identify more strongly with collective knowledge exchange goals rather than their self-interests (Flynn, 2005). Taken together, we hypothesize:

> **Hypothesis 3a.** *The positive relation between transformational leadership and team knowledge goal generation is conditional on team-level TMX such that the relation strengthens as team-level TMX increases.*

Hypothesis 3b. *The positive relation between transformational leadership and team knowledge goal striving is conditional on team-level TMX such that the relation strengthens as team-level TMX increases.*

Integrating the aforementioned hypotheses, we expect that the indirect relations between transformational leadership and team knowledge exchange via team knowledge goal generation and team knowledge goal striving are contingent upon team-level TMX, such that these positive indirect effects are stronger for teams with higher levels of TMX. Team-level TMX is an important boundary condition for the downstream consequences of transformational leadership for team goal pursuit and knowledge exchange because it enables teams to reach consensus and achieve relational coordination, which is crucial for collective motivational processes (Chen & Kanfer, 2006; Kamdar & van Dyne, 2007). In a team context characterized by high-quality TMX, team members have additional resources they can tap and the motivation to contribute to team goals (L. C. Wang & Hollenbeck, 2019), and are therefore better positioned to translate transformational leader signals into team outputs that go above and beyond their job description. As such, high team-level TMX provides a beneficial social context that facilitates transformational leadership to elicit team knowledge exchange via team knowledge goal pursuit.

Hypothesis 4a. *The positive indirect relation betweren transformational leadership on team knowledge exchange via team knowledge goal generation is conditional on team-level TMX such that the indirect relation strengthens as team-level TMX increases.*

Hypothesis 4b. *The positive indirect relation betweren transformational leadership on team knowledge exchange via team knowledge goal striving is conditional on team-level TMX such that the indirect relation strengthens as team-level TMX increases.*

Method

Sample and Procedure

We surveyed work teams from two workplaces of a large chemical manufacturing company located in South China. All work teams consisted of front-line production workers who coordinated on a number of tasks on a daily basis to facilitate the manufacturing process of chemical products. For example, one of the most important job positions in the chemical fiber mill is the spinner. Several spinners work as a team and are responsible for the silk in a certain area. One of their major task is to make sure that silk lines are not broken. When there is a broken silk line, all team members need to work together to reconnect the line as quickly as possible. In addition, in all surveyed frontline teams, senior members are expected to mentor less experienced members and exchange knowledge with them to improve the effectiveness of the whole team. Thus, knowledge exchange is essential to team performance in this context, because each production stage requires the joint input of multiple members and members need to exchange knowledge to ensure the concerted operation of the manufacturing process. However, team members may have the incentive to hoard their knowledge, because their compensation was primarily linked to their individual performance. Each work team had only one designated team leader.

A total of 134 work teams were contacted and invited to participate. Among the 134 teams, 118 teams participated in the study (response rate = 88.06%). We used paper-pencil questionnaires at two time points that were three months apart to collect the data. The human resource department of the manufacturing company assisted us in distributing the survey questionnaires. Participants were ensured of the confidential treatment of their data by the research team in an enclosed letter. The completed questionnaires were collected by research assistants. Usable data from both waves were returned by 579 team members from 118 teams, with a range of 3 to 11 members responding from each team. The average team size obtained from the company record was 5.53 ($SD = 1.95$). On average, team members were 39.33 years old ($SD = 8.94$) and 43.51% were female. Our independent variable (i.e., transformational leadership) and moderator (i.e., team-level TMX) were measured at Time 1, and our

mediators (i.e., team knowledge goal generation and team knowledge goal striving) and

dependent variable (i.e., team knowledge exchange) were measured at Time 2.

Measures

We followed translation-back translation procedure by Brislin (1970) to translate the

measures from English to Chinese. Unless otherwise noted, all the variables were measured

on 7-point scales (1 = *strongly disagree*, 7 = *strongly agree*). For the variables for which we

assumed a consensus-based compositional model (Chan, 1998), we assessed the empirical

support for the aggregation to the team level by calculating ICC1, ICC2 (Bliese, 2000), and

$r_{wg(j)}$ (James, Demaree, & Wolf, 1984). In line with methodological recommendations

(LeBreton & Senter, 2008), and to account for the possibility of systematic biases in terms of

leniency and central tendency, we provide $r_{wg(j)}$ values based on the uniform null distribution

(lack of bias assumed; $\sigma_E^2 = 4.00$ for our 7-point scales), a moderately skewed distribution

(leniency bias assumed; $\sigma_E^2 = 2.14$), and a triangular distribution (central tendency bias

assumed; $\sigma_E^2 = 2.10$).

Transformational leadership. Transformational leadership was measured at Time 1

with the 23-item scale from Podsakoff et al. (1990). A sample item from the scale is "Has

stimulated me to rethink the way I do things." The average score of responses from team

members was used to compute this measure based on a direct consensus model (Chan, 1998).

The $r_{wg(j)}$ values across the 118 teams and across the three assumed distributions were

acceptable ($M_{uniform} = .94$, Median$_{uniform} = .99$; $M_{skewed} = .75$, Median$_{skewed} = .96$; $M_{triangular} =$

.74, Median$_{triangular} = .96$). The ICC1 and ICC2 values were .33 ($F = 3.00$, $p < 0.01$) and .67,

respectively. Thus, we concluded that the empirical evidence supported aggregation. The

Cronbach's alpha for the scale at the team level was .98.

Team knowledge goal generation. We measured team knowledge goal generation at

Time 2 with five items adapted from Bindl et al. (2012). The items are "Our team views

knowledge exchange and integration as an important team goal"; "Our team aims at

improving the team knowledge exchange quality"; "Our team seeks to enhance the efficiency of team knowledge exchange"; "Our team aims at improving the sharing and integration of knowledge, ideas, and views from team members"; "Our team develops various approaches to promote knowledge sharing and combination among team members". We computed this measure by averaging the responses from team members based on a referent-shift consensus model (Chan, 1998). Empirical evidence supported aggregation of individual-level data to the team level. The $r_{wg(j)}$ values across the three assumed distributions ($M_{uniform} = .89$, $Median_{uniform} = .94$; $M_{skewed} = .74$, $Median_{skewed} = .87$; $M_{triangular} = .73$, $Median_{triangular} = .86$) were acceptable. The ICC1 and ICC2 values were .29 ($F = 2.81$, $p < 0.01$) and .64, respectively. The Cronbach's alpha for the scale at the team level was .95.

Team knowledge goal striving. We measured team knowledge goal striving at Time 2 with five items adapted from Bindl et al. (2012). Specifically, we asked respondents to indicate how much time and effort members from their team invested in the following knowledge goal striving activities (*1 = very little*, *7 = a lot*): sharing knowledge with other members, integrating knowledge and ideas from multiple members, improving team knowledge exchange quality, facilitating members to better communicate and integrate knowledge and ideas, and implementing strategy that improves team knowledge exchange. We computed this measure by averaging the responses from team members based on a referent-shift consensus model (Chan, 1998). Empirical evidence supported aggregation of individual-level data to the team level. The $r_{wg(j)}$ values across the three assumed distributions were acceptable ($M_{uniform} = .81$, $Median_{uniform} = .91$; $M_{skewed} = .58$, $Median_{skewed} = .75$; $M_{triangular} = .57$, $Median_{triangular} = .74$). The ICC1 and ICC2 values were .26 ($F = 2.60$, $p < 0.01$) and .62, respectively. The Cronbach's alpha for the scale at the team level was .94.

Team-member exchange. We measured team-member exchange at Time 1 with an established ten-item scale (Liden, Wayne, & Sparrowe, 2000; Murphy, Wayne, Liden, & Erdogan, 2003; Ozer, 2011; Seers, 1989). A sample item is "Other team members often let me

know when I have done something that makes their job easier (or harder)". Team-level TMX emerges when team members agree with regard to the general level of reciprocity in social interactions among members in a team (Seers et al., 1995). The average score of responses from team members was used to compute this measure based on a direct consensus model (Chan, 1998). Coefficients of agreement empirically supported aggregation of individual-level data to the team level. The $r_{wg(j)}$ values across the three assumed distributions were acceptable ($M_{\text{uniform}} = .88$, Median$_{\text{uniform}} = .97$; $M_{\text{skewed}} = .68$, Median$_{\text{skewed}} = .92$; $M_{\text{triangular}} = .67$, Median$_{\text{triangular}} = .92$). The ICC1 and ICC2 values were .20 ($F = 1.99$, $p < 0.01$) and .50, respectively. The Cronbach's alpha for the scale at the team level was .93.

Team knowledge exchange. We measured team knowledge exchange at Time 2 with the four-item scale developed by Faraj and Sproull (2000). Faraj and Sproull (2000) had developed this scale to assess the extent to which teams bring their expertise to bear as part of their expertise coordination. A sample item is "People in our team share their special knowledge and expertise with each other." The average score of responses from team members was used to compute this measure based on a referent-shift consensus model (Chan, 1998). Coefficients of agreement empirically supported aggregation of individual-level data to the team level. The $r_{wg(j)}$ values across the three assumed distributions were acceptable ($M_{\text{uniform}} = .82$, Median$_{\text{uniform}} = .94$; $M_{\text{skewed}} = .66$, Median$_{\text{skewed}} = .86$; $M_{\text{triangular}} = .65$, Median$_{\text{triangular}} = .85$). The ICC1 and ICC2 values were .28 ($F = 2.76$, $p < 0.01$) and .64, respectively. The Cronbach's alpha for the scale at the team level was .93.

Control variables. We controlled for three variables in our analyses: team cooperation, team size, and workplace. We included team cooperation as a control because we aimed to test whether the proposed motivational mechanisms explain variance in team knowledge exchange beyond the behavioral mechanism of team cooperation established by Jiang and Chen (2018). Team cooperation was measured with the four-item measure used by Jiang and Chen (2018). A sample item is "Members of my team help team members without

being asked." The average score of responses from team members was used to compute this measure in line with the referent-shift consensus model (Chan, 1998). Coefficients of agreement empirically supported aggregation to the team level. The $r_{wg(j)}$ values across the three assumed distributions were acceptable ($M_{uniform} = .85$, $Median_{uniform} = .93$; $M_{skewed} = .66$, $Median_{skewed} = .85$; $M_{triangular} = .65$, $Median_{triangular} = .84$). The ICC1 and ICC2 values were .30 ($F = 2.85$, $p < 0.01$) and .65, respectively. The Cronbach's alpha for the scale at the team level was .93. In addition, we controlled for team size obtained from the company record because team size has been suggested to influence various team processes. Finally, we also controlled for workplace to account for the possible variance attributable to the fact that we surveyed work teams from two different workplaces of one large manufacturing company (78 work teams were from Workplace 1, 41 work teams were from Workplace 2).

Analytical Strategy

We tested our team-level hypotheses by predicting our mediators and our dependent variable in one integrated SEM-based path model. Covariances among the three mediators were allowed. To examine the proposed moderation, we used the Johnson-Neyman (J-N) technique, to identify regions of moderator values at which predictor-outcome relations are significantly different from zero (Preacher, Curran, & Bauer, 2006). We further tested the conditional indirect effects using Monte Carlo method with 20,000 replications, which estimated the 95 percent confidence intervals for the index of moderated mediation (Hayes, 2013, 2015). The Monte Carlo confidence interval method is useful because it simulates the sampling distribution from the model estimates and their asymptotic variances and covariances instead of assuming a normal distribution (Bauer, Preacher, & Gil, 2006; Preacher & Selig, 2012). The independent and the moderator variable were grand-mean centered, and interaction terms were created by multiplying corresponding grand-mean centered variables. We performed all analyses using R version 3.2.3 (R Core Team, 2017).

Results

We conducted a multilevel confirmatory factor analysis (CFA) to examine the construct validity of the hypothesized variables (i.e., transformational leadership, TMX, team knowledge goal generation, team knowledge goal striving, team cooperation, and team knowledge exchange). To achieve an optimal ratio of sample size to number of estimated parameters, we followed previous research (e.g., Chin, 1998; Sass & Smith, 2006) and randomly combined scale items into three parcels for each variable. The hypothesized model was tested by loading items on their respective latent variables at the within-team level and the between-team level. Results showed that the hypothesized model with distinct but correlated factors fit well to the data: χ^2 (240) = 311.84, p = .001, comparative fit index (CFI) = .99, Tucker-Lewis Index (TLI) = .99, and root mean square error of approximation (RMSEA) = .02. In addition, the hypothesized model was superior to all five-factor models with items of two variables loaded on one factor at both levels: $\Delta\chi^2$s (10) $\geqslant$ 296.64, $p < .001$ (for details, please see Table 1). Specifically, the proposed six-factor model fit significantly better than alternative five-factor models in which (a) team knowledge goal generation and team knowledge exchange loaded on the same factor (χ^2 [250] = 672.17, $p < .001$, CFI = .94, TLI = .92, RMSEA = .06), or (b) team knowledge goal striving and team knowledge exchange loaded on the same factor (χ^2 [250] = 938.75, $p < .001$, CFI = .90, TLI = .88, RMSEA = .07). The proposed six-factor model also fits better than an alternative four-factor model in which team knowledge goal generation, team knowledge goal striving, and team knowledge exchange loaded on a single factor (χ^2 [258] = 1211.07, $p < .001$, CFI = .86, TLI = .83, RMSEA = .08).

Insert Table 1 about here

Descriptive statistics, bivariate correlations, and the Cronbach's alphas for the studied variables are presented in Table 2.

Insert Table 2 about here

The results for hypotheses testing are presented in Table 3 and Figure 2. Accordingly, the effects of transformational leadership on team knowledge goal generation ($\gamma = .41$, $p < .001$) and team knowledge goal striving ($\gamma = .50$, $p < .001$) were positive and statistically significant, supporting Hypotheses 1a and 1b. Further, team knowledge goal generation ($\gamma = .24$, $p = .02$) and team knowledge goal striving ($\gamma = .34$, $p < .001$) were positively and significantly related to team knowledge exchange, supporting Hypotheses 2a and 2b. With regard to the control mechanism of team cooperation, we found that the relation between transformational leadership and team cooperation was not significant ($\gamma = .21$, $p = .08$), but team cooperation was significantly related to team knowledge exchange ($\gamma = .27$, $p = .001$). Combining these effects, we next examined the indirect effects. The first estimated indirect effect through team knowledge goal generation was .10 with a 95% CI of [.013, .201]. The second estimated indirect effect through team knowledge goal striving was .16 with a 95% CI of [.067, .308]. However, the indirect effect of transformational leadership on team knowledge exchange via team cooperation, the specified control mechanism, was not significant (indirect effect = .06, 95% CI [-.007, .144]).

Insert Table 3 and Figure 2 about here

Next, for Hypotheses 3a and 3b, we tested the moderation of TMX on the relations between transformational leadership and the two mediators—team knowledge goal generation and team knowledge goal striving. The first interaction term between transformational leadership and TMX onto team knowledge goal generation was positive and significant ($\gamma = .25$, $p = .02$). We then used J-N technique to plot the band of significance for the simple slope of transformational leadership on team knowledge goal generation at the full observed centered TMX range of [-2.12, 1.38]. As shown in Figure 3, the relationship between

transformational leadership and team knowledge goal generation is non-significant for negative values of centered team-level TMX that range between -2.12 and -0.73. This relationship becomes positive and significant for TMX values above -0.73. Therefore, we found support for Hypothesis 3a. However, Hypothesis 3b was not supported because the moderating effect of TMX on the relation between transformational leadership and team knowledge goal striving was not significant ($\gamma = .19$, $p = .12$). With regard to the control mechanism, we found that the interaction between transformational leadership and TMX onto team cooperation was also non-significant ($\gamma = .06$, $p = .61$).

Insert Figure 3 about here

Finally, we tested the significance of the hypothesized conditional indirect effects. For Hypothesis 4a, the confidence interval for the index of moderated mediation was [.002, .142], which did not include zero. Therefore, we conclude that the mediation effect of team knowledge goal generation on the relation between transformational leadership and team knowledge exchange was moderated by TMX. With the J-N technique, we identified that the indirect effect of transformational leadership on team knowledge exchange via team knowledge goal generation was positive and significant when centered team-level TMX ranged between -.56 and 1.38, and this indirect effect became non-significant when centered team-level TMX ranged between -2.12 and -.56. Taken together, we found support for Hypothesis 4a. For Hypothesis 4b, the confidence interval for the index of moderated mediation was [-.016, .167], which included zero. Therefore, the mediation effect of team knowledge goal striving on the relation between transformational leadership and team knowledge exchange was not moderated by TMX. Thus, Hypothesis 4b was not supported.

Robustness check

We implemented the aggregate-split approach (Ostroff, Kinicki, & Clark, 2002) to address possible concerns about common method bias. The main concern that we needed to

address was the possible common method bias among the mediators and team knowledge exchange, as data on those variables were collected at the same time point (Time 2) and from the same sources (team members). Thus, we randomly assigned team members to either Sample Section A or Sample Section B. We then used the data from Sample Section A to create variable scores for control variables (Time 1), independent variables (Time 1), and mediators (Time 2), and data from Sample Section B to create variable scores for the dependent variable (Time 2). We found that most specified paths stayed robust. However, the relationship between team knowledge goal generation and team knowledge exchange ($\gamma = .23$, $SE = .11$, $p = .06$) and the interaction effect of transformational leadership with team-level TMX onto team knowledge goal generation ($\gamma = .18$, $SE = .10$, $p = .07$) became weaker.

Discussion

In this study, we took a team goal pursuit perspective to clarify through which mechanisms and under which conditions transformational leadership affects team knowledge exchange. Our findings demonstrated that team knowledge goal generation and team knowledge goal striving represented two parallel motivational mediating mechanisms linking transformational leadership to team knowledge exchange. Further, team-level TMX amplified the influence of transformational leaders on team knowledge goal generation. In addition, the indirect effect of transformational leadership on team knowledge exchange via team knowledge goal generation was conditional upon TMX. Importantly, we obtained these results while controlling for team cooperation as a behavioral mediating mechanism that Jiang and Chen (2018) had previously established.

Theoretical and Practical Implications

Our study has several theoretical implications. First, we advance the literature on the antecedents of team knowledge exchange by explicating team knowledge goal generation and team knowledge goal striving as dual mediating mechanisms linking transformational leadership to team knowledge exchange. Our findings demonstrated that the specific

behaviors transformational leaders engage in, for example, providing intellectual stimulation and setting high performance standards (Podsakoff et al., 1990), motivate their teams to engage in knowledge-based goal pursuit behaviors. As a result, we provide insights into how leadership, as an important team ambient input, advances team knowledge exchange.

Further, we advance insights on team motivation processes based on Chen and Kanfer (2006), by deciphering the underlying motivational goal pursuit mechanisms consisting of team knowledge goal generation and team knowledge goal striving. Our findings provide empirical support for the conceptual argument that team knowledge goal pursuit mechanisms at the team level are functionally similar to goal pursuit mechanisms at the individual level, as proposed in the system's theory of motivated behavior in work teams (Chen & Kanfer, 2006). We thus advance the literature on "the determinants, mechanisms, and consequences of team-level motivation processes" (Chen & Kanfer, 2006, p. 224), by specifying how teams direct and sustain effort to achieve team knowledge exchange. Specifically, team motivation of knowledge exchange is facilitated when team members identify knowledge exchange as an important team process goal and collectively direct their effort toward achieving such goals (Chen & Kanfer, 2006; Hollenbeck & Klein, 1987). This study thus adds to our knowledge about the nature of team motivational processes that trigger collective knowledge exchange.

In addition, we established team-level TMX as an important boundary condition that qualifies the effect of transformational leadership on team knowledge goal generation. The fact that the moderating effect of TMX on the relation between transformational leadership and team knowledge goal striving was not significant might be attributable to our sample size and the general difficulty of identifying interactions effects. Overall, our findings emphasize that albeit functionally similar, team-level goal pursuit processes differ from individual-level goal pursuit processes in that they reflect reciprocated collective efforts of interactive team members who need to coordinate their actions and reach consensus in their goal-directed efforts (Chen & Kanfer, 2006; Kamdar & van Dyne, 2007). Thus, team-level TMX, as a

reflection of the general level of reciprocity and relationship quality within the team (Seers et al., 1995), shaped how team members collectively translated transformational leadership into knowledge goal pursuit. As such, the effect of transformational leadership on team knowledge exchange cannot be understood comprehensively without considering the social processes among team members, which shape the way that they react to the behavior of their leaders (Rosing et al., 2011).

   Practically, the findings of the current study provide important implications for leaders to manage knowledge exchange in teams. First, to be able to perform transformational behaviors that facilitate team knowledge exchange, team leaders need training sessions in which they can reflect on and set goals for their own transformational leadership, and discuss and role-play how such behaviors can be implemented (Barling, Weber, & Kelloway, 1996; Yammarino, Salas, Serban, Shirreffs, & Shuffler, 2012). Second, the two parallel mediating mechanisms of team knowledge goal generation and team knowledge goal striving show that team leaders can facilitate team knowledge exchange by supporting goal pursuit processes within their teams. To increase team knowledge goal generation, leaders can increase the salience and utility of team knowledge exchange by explaining its benefits for team effectiveness. In addition, team leaders can facilitate planning processes by sharing insights on how to exchange knowledge and by creating an environment in which sharing resources is encouraged. To increase team knowledge goal striving, team leaders could increase the teams' willingness to invest effort into team knowledge exchange by increasing the goals' attractiveness. For example, team leaders can make team knowledge exchange goals public via internal communication channels (e.g., newsletters), involve their teams in the goal formation process during planning meetings, and clearly articulate the scope of teams' task to reduce distractions. Further, team leaders can encourage reflection about the current approach on how to achieve team knowledge exchange, by creating opportunities for related discussion in regular team meetings and by encouraging their teams to aim toward continuous

improvement. Third, as TMX strengthens the effect of transformational leaders on team knowledge goal generation, teams need to be supported in creating open and safe interpersonal relationships. Fostering an organizational climate in which cooperation and teamwork is valued can positively influence team members' expectations about appropriate behavior towards their coworkers (Tse, Dasborough, & Ashkanasy, 2008). For example, organizations can invest in trainings, such as team-building exercises, to facilitate the development of positive interpersonal relationships at work (Banks et al., 2014).

Limitations and Future Research Directions

We acknowledge several limitations of our study. First, while we have clarified how transformational leadership is particularly relevant to foster collective motivation for team knowledge exchange, the concept of charismatic—transformational leadership has been criticized (Van Knippenberg & Sitkin, 2013). The identified shortcomings of the leadership construct include its lack of a clear conceptual multi-dimensional definition, the insufficient explanation of mediating and moderating effects for the underlying sub-dimensions, the confounds of transformational leadership with its effect in its measurement, and the use of invalid measurement instruments that fail to reproduce the dimensional structure and lack distinctiveness to other leadership constructs. In our study, we were unable to satisfactorily solve the possible shortcomings of the transformational leadership construct, as we focused on developing a predictive model that deciphers the motivational mechanism and boundary conditions of the influence of transformational leaders on team knowledge exchange. However, future research may address the possible shortcomings, for example, via a comparison of the effects of different leadership constructs on team knowledge exchange.

Second, although we separated the measurement timing of the independent variable and moderator from the mediators and dependent variable by three months (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), common method variance still posed a concern as we measured the mediators and dependent variable at the same time and from the same sources

due to constraints from the data collection site. Future studies may therefore employ time-lagged designs in which the measurements of mediators and dependent variables are temporally separated to address the potential inflation of effect sizes due to this limitation. In addition, to establish causality, researchers can complement our findings by employing an experimental design to manipulate transformational leadership and test its effect on followers' knowledge exchange behavior in team tasks.

Third, using data from a team sample in China limited the generalizability of our research conclusions. Future studies can advance the cross-cultural generalizability of our findings by replicating and contrasting our conceptual model in different cultural contexts. In addition, future studies can test whether the effect of transformational behaviors that emphasize collective goal attainment is different in more individualistic cultures. For example, power distance and collectivism have been identified as relevant contingency factors of the relation between transformational leadership and team performance, such that in teams with higher power distance and collectivism, transformational leaders had stronger effects on team performance (Schaubroeck, Lam, & Cha, 2007).

Our findings provide several additional points of departure for future research. First, future studies can further enhance our understanding about the relation between transformational leadership and team knowledge exchange by examining additional mediating mechanisms. First, moving beyond the motivational goal pursuit mechanisms established by our study and the behavioral mechanism established by Jiang and Chen (2018), future studies can investigate whether team-level cognitive (e.g., shared mental models; Nonaka, 1991) and affective (e.g., trust; Mayer, Davis, & Schoorman, 1995) mechanisms also play roles in facilitating transformational leadership to promote team knowledge exchange. Second, future research could further expand our understanding of antecedents of team knowledge exchange processes by identifying potential barriers for team knowledge exchange and closely examining how leadership behaviors can help remove such barriers. For example, team

knowledge exchange may be inhibited by job characteristics such as time pressure or organizational incentive schemes that reward individual rather than collective performance. Future research can test whether leadership behaviors can mitigate these potential negative effects on team knowledge exchange. Finally, prior research has developed several knowledge frameworks to capture different types of knowledge (e.g., job knowledge, social knowledge, and cultural or political knowledge (Berthoin Antal, 2000; Dutton, Ashford, O'Neill, & Lawrence, 2001). Future research may contribute to the literature by specifying how transformational leadership may promote the exchange of different types of knowledge in distinct ways.

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Table 1

Comparison of Measurement Models

Model	Factors	χ^2	df	$\Delta \chi^2$	CFI	TLI	RMSEA
Baseline model	Six-factor model	311.84	240		.99	.99	.02
Model 1	Five-factor model: Combine TL and TMX	925.97	250	614.13[**]	.90	.88	.07
Model 2	Five-factor model: Combine TL and TKGG	1850.71	250	1538.87[**]	.77	.71	.11
Model 3	Five-factor model: Combine TL and TKGS	1304.80	250	992.96[**]	.85	.81	.09
Model 4	Five-factor model: Combine TL and TC	1088.71	250	776.87[**]	.88	.85	.08
Model 5	Five-factor model: Combine TL and TKE	1260.88	250	949.04[**]	.85	.82	.09
Model 6	Five-factor model: Combine TMX and TKGG	1220.98	250	909.14[**]	.86	.83	.08
Model 7	Five-factor model: Combine TMX and TKGS	1263.99	250	952.15[**]	.86	.82	.08
Model 8	Five-factor model: Combine TMX and TC	1017.09	250	705.25[**]	.89	.86	.07
Model 9	Five-factor model: Combine TMX and TKE	1493.57	250	1181.73[**]	.82	.78	.09
Model 10	Five-factor model: Combine TGGG and TKGS	792.41	250	480.57[**]	.92	.90	.06
Model 11	Five-factor model: Combine TKGG and TKE	672.17	250	360.33[**]	.94	.92	.06
Model 12	Five-factor model: Combine TKGS and TKE	938.75	250	626.91[**]	.90	.88	.07
Model 13	Five-factor model: Combine TC and TKE	608.48	250	296.64[**]	.95	.94	.05
Model 14	Four-factor model: Combine TKGG, TKGS, and TKE	1211.07	258	899.23[**]	.86	.83	.08

Note. TL = transformational leadership; TMX = team-member exchange; TKGG = team knowledge goal generation; TKGS = team knowledge goal

striving; TC = team cooperation; TKE = team knowledge exchange; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root

Mean Square Error of Approximation. [*] $p < .05$ and [**] $p < .01$.

Table 2

Means, Standard Deviations, and Correlations of Studied Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8
1. Team size	4.89	1.78	--							
2. Workplace[a]	0.35	0.48	-.20*	--						
3. Transformational leadership	5.67	0.81	-.07	.18	(.98)					
4. Team-member exchange	5.62	0.66	.03	.15	.69**	(.93)				
5. Team cooperation	5.74	0.79	-.06	.29**	.32**	.29**	(.93)			
6. Team knowledge goal generation	5.62	0.74	-.07	.31**	.40**	.29**	.74**	(.95)		
7. Team knowledge goal striving	5.08	0.85	-.02	.19*	.41**	.28**	.72**	.79**	(.94)	
8. Team knowledge exchange	5.55	0.78	-.08	.30**	.33**	.30**	.73**	.75**	.76**	(.93)

Note. N = 118 teams. [a] 77 teams from Workplace 1 (coded as 0), 41 teams from Workplace 2 (coded as 1). Team-level Cronbach's alphas are presented on the diagonal.

* $p < .05$ and ** $p < .01$.

Table 3

Unstandardized SEM-Based Path Modeling Results

	Team knowledge goal generation (T2)			Team knowledge goal striving (T2)			Team cooperation (T2)			Team knowledge exchange (T2)		
	Estimate	*SE*	*p*	Estimate	*SE*	*p*	Estimate	*SE*	*p*	Estimate	*SE*	*p*
Intercept	5.39**	.08	< .001	4.92**	.10	< .001	5.58**	.09	< .001	0.88*	.36	.02
Team size	.01	.03	.71	.02	.04	.55	.003	.04	.94	-.01	.02	.56
Workplace	.40**	.13	.002	.24	.15	.11	.39**	.14	.01	.12	.09	.19
Transformational leadership (TL, T1)	.41**	.11	< .001	.50**	.13	< .001	.21	.12	.08	-.06	.08	.44
Team-member exchange (TMX, T1)	-.03	.13	.84	-.05	.15	.72	.13	.14	.37	.11	.09	.20
TL x TMX (T1)	.25**	.10	.02	.19	.12	.12	.06	.12	.61	.06	.07	.45
Team cooperation (T2)										.27**	.08	.001
Team knowledge goal generation (T2)										.24*	.10	.02
Team knowledge goal striving (T2)										.34**	.09	< .001
R^2		.26			.21			.17			.69	

Note. $N = 118$ teams. T = time point of data collection.
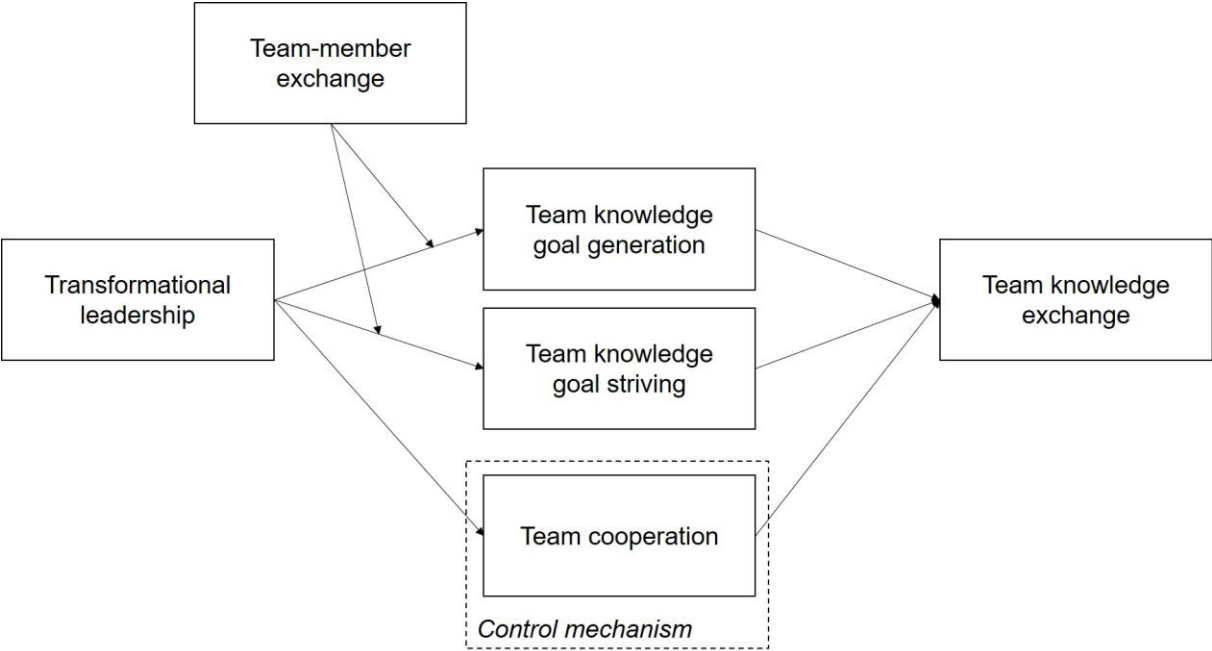
* $p < .05$ and ** $p < .01$.

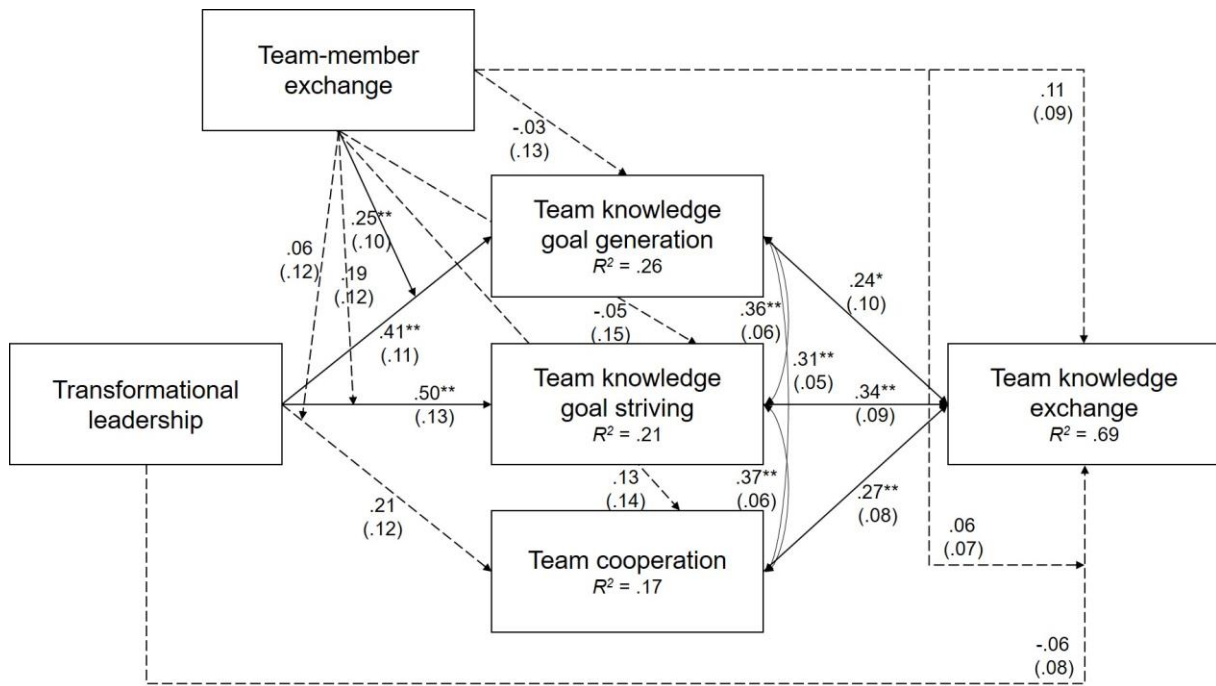*Figure 1.* Hypothesized Research Model

Figure 2. Unstandardized SEM-Based Path Modeling Results

Note. Unstandardized coefficient estimates and standards errors (in parentheses) are reported in the figure. Non-significant relationships are presented in dashed lines. For the purpose of simplification, we do not display the paths of the control variables (please see Table 2 for details).
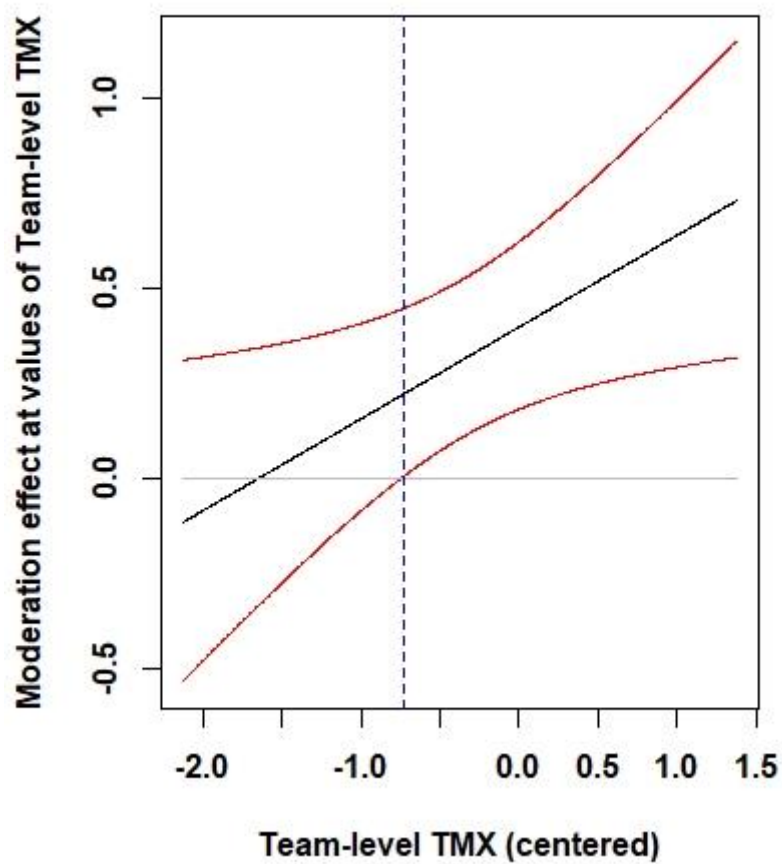
Figure 3. Regions of Significance for the Interaction between Transformational Leadership and Team-Level TMX on Team Knowledge Generation

Note. Dashed vertical line reflects the upper bound point at which the confidence band crosses zero (centered team-level TMX = -0.73), implying that the simple slope between transformational leadership and team knowledge generation is positive and significantly different from zero for centered team-level TMX values of -0.73 and above.