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Transformational leadership and leader–member exchange in distributed teams: The roles of electronic dependence and team task interdependenc

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Abstract

While the use of distributed teams enabled by digital technologies is burgeoning in contemporary organizations, leaders of distributed teams face different challenges than those of co-located teams. Our knowledge about how these differences play out, however, is not yet fully developed. To address this, the present study investigates how transformational leaders may develop high-quality leader-member exchange (LMX) relationships in distributed teams. Based on two field studies of distributed teams in three organizations, the present study examined how the joint effect of electronic dependence and team task interdependence may influence the relationship between transformational leadership and LMX quality. Across both studies, results from three-way interaction analyses demonstrated that transformational leadership related negatively to LMX quality when electronic dependence and task interdependence were both high. Based on the results, we discuss theoretical and practical implications for leaders with a relationship-based approach in distributed teams.

Keywords: Distributed teams; transformational leadership; electronic dependence; task interdependence; leader–member exchange.

Transformational leadership and leader–member exchange in distributed teams: The roles of electronic dependence and team task interdependence

1. INTRODUCTION

In recent decades, organizations have increasingly employed distributed teams with digital solutions as a means to improve organizational efficiency and effectiveness (Colbert, Yee, & George, 2016). Distributed teams can easily be arranged across temporal, geographical, and organizational boundaries, and are assumed to benefit employees and organizations alike through increased flexibility, work-life balance, job satisfaction, and performance (Gilson, Maynard, Young, Vartiainen, & Hakonen, 2015; Liao, 2017; Martins, Gilson, & Maynard, 2004). However, individuals working in distributed teams, including leaders, may seldom meet their fellow team members in person. This makes the team dynamics and leadership challenges different from those of co-located teams (Dulebohn & Hoch, 2017; Gibson & Gibbs, 2006).

Despite the alleged benefits, distributed teams can also obtain less desirable individual and organizational outcomes than traditional co-located teams do (Gibson & Gibbs, 2006; Ortiz de Guinea, Webster, & Staples, 2012). For instance, compared to face-to-face teams, distributed teams are likely to display less organizational citizenship behaviors (Ganesh & Gupta, 2010), experience more communication issues (Daim et al., 2012; Huang, Kahai, & Jestice, 2010), and higher task conflict, as well as lower levels of team satisfaction, knowledge sharing, trust, and cooperative behavior (Hoch & Kozlowski, 2014; Ortiz de Guinea et al., 2012).

As the digital workforce and the use of computer mediated technology increase, the question of how organizations may effectively leverage the benefits of technology while avoiding the downsides remains understudied, and likely involves leadership (Colbert et al., 2016). The role of leadership has been considered essential to better facilitate effective distributed teams (Eubanks, Palanski, Olabisi, Joinson, & Dove, 2016; Gilson et al., 2015; Hambley, O'Neill, & Kline, 2007). Leaders of distributed teams need to be able to build trust

and relationships with their distributed team members without physical proximity (Dulebohn & Hoch, 2017). Relevant to this study, a high-quality relationship with a leader, i.e., leader-member exchange (LMX) characterized by high levels of responsibility, decision influence, and access to resources (Graen & Uhl-Bien, 1995), is important for distributed team members to feel less isolated in the distributed work environment (Gajendran & Joshi, 2012). Among other leadership styles, transformational leadership, with leader behaviors focused on transcending work goals, purposes, and higher-order intrinsic needs (Judge & Piccolo, 2004), is often considered a beneficial leadership style for distributed teams (Hoch & Kozlowski, 2014). However, although transformational leadership provides teams with visions and a collective belief in their ability to succeed (Schaubroeck, Lam, & Cha, 2007), these visions and personal considerations can be more difficult to transmit, detect, and interpret in distributed settings (Hoch & Kozlowski, 2014). We therefore argue that transformational leaders can be less effective in building high-quality LMX relationships with followers in distributed teams. Such an investigation is important because the relationship between transformational leadership and LMX quality has been developed and tested primarily in traditional team contexts (Dulebohn, Bommer, Liden, Brouer, & Ferris, 2012; Martin, Guillaume, Thomas, Lee, & Epitropaki, 2016).

To better understand conditions under which transformational leadership can be more or less effective in developing LMX quality in distributed teams, the present study examines the moderating roles of electronic dependence and task interdependence. First, we argue that transformational leadership cues are harder to transmit when team members are highly dependent on electric communication tools, i.e., electronic dependence, to go about their daily work. Electronic dependence refers to the extent to which team members are dependent on computer-mediated tools, such as e-mail, teleconferencing, and collaborative software, to plan and coordinate tasks (Gibson & Gibbs, 2006; Liao, 2017). Second, we investigate the

moderating role of task interdependence, which is concerned with the extent to which team members are dependent on other members' work to complete their own (Langfred, 2000). Task interdependence may shed light on team member interpersonal interaction patterns that can influence the effectiveness of transformational leadership on LMX quality. Jointly, we propose that transformational leadership is likely to be less effective to develop high-quality LMX when distributed team members are highly dependent on electronic communication while their task interdependence is high. We examined our hypotheses by conducting two independent field studies among distributed team members in a total of three organizations operating with working units across physically dispersed offices.

By doing so, we seek to contribute to the call for more knowledge about how leaders may effectively lead in distributed teams (Dulebohn & Hoch, 2017; Liao, 2017). In particular, we seek to investigate conditions under which transformational leadership may be less effective in developing high-quality leader–follower relationships by looking into the contextual role of electronic dependence and task interdependence. In addition, we extend the current knowledge in the LMX literature by mapping out potential contextual factors that influence the effect of transformational leadership on LMX quality in distributed teams. Finally, we offer practical implications for leaders to lead and build beneficial, high-quality exchange relationships in digitized workplaces.

2. THEORY AND HYPOTHESES

2.1 Transformational leadership and leader-member exchange in distributed teams: The moderating role of electronic dependence

A popular framework for contemporary leadership is the conceptualization of transformational leadership, which describes leadership behaviors, including articulating a vision, providing a work model consistent with that vision, fostering the acceptance of goals, and expressing performance expectations, as well as providing individualized support and

intellectual stimulation (Bass, 1990; Bass & Avolio, 1993; Podsakoff, MacKenzie, & Bommer, 1996). In traditional settings, transformational leadership has been found to relate positively to outcomes such as work engagement and task performance (Aryee, Walumbwa, Zhou, & Hartnell, 2012), job satisfaction, self-efficacy, and leader commitment (Kovjanic, Schuh, Jonas, Quaquebeke, & Dick, 2012). It also positively affects intrinsic motivation, organizational citizenship behaviors (Piccolo & Colquitt, 2006), loyalty, and trust in leaders (Jung, Yammarino, & Lee, 2009).

Research in traditional settings has also demonstrated a positive relationship between transformational leadership and LMX relationship quality (e.g., Martin et al., 2016; H. Wang, Law, Hackett, Wang, & Chen, 2005). LMX quality refers to the quality of the distinct dyadic relationship between a leader and individual followers (Graen & Uhl-Bien, 1995). A high-quality LMX relationship typically includes characteristics such as high levels of mutual trust, interaction, and support (Graen & Uhl-Bien, 1995; Ilies, Nahrgang, & Morgeson, 2007), as well as high degrees of reciprocity in that both parties contribute resources valued by the other party (Schyns & Day, 2010). Such high-quality relationships are desirable, as LMX is found to predict performance across a range of settings and conditions (Ilies et al., 2007; Martin et al., 2016).

While the use of computer-mediated communication technologies for team processes provides great benefits (Hertel, Stone, Johnson, & Passmore, 2017), such as flexibility in scheduling work across locations, it is not without challenges (Mesmer-Magnus, DeChurch, Jimenez-Rodriguez, Wildman, & Shuffler, 2011; Walvoord, Redden, Elliott, & Coovert, 2008). Due to the physical distance, distributed team members often rely on computer-mediated tools (Gibson & Gibbs, 2006; Liao, 2017). The usage of such communication tools may limit informal, spontaneous interaction and hinder knowledge interpretation (Desanctis & Monge, 1998). Previous research on distributed teams has demonstrated that when team members do

not meet face to face, they may lack mutual knowledge of each other's situation, which can lead to increased communication problems (Gibson & Gibbs, 2006)**.** Indeed, high levels of electronic dependence in distributed teams are found to be negatively correlated with knowledge sharing (Klitmøller & Lauring, 2013), trust, team commitment (Jimenez, Boehe, Taras, & Caprar, 2017), and communication quality in teams (Daim et al., 2012). This is because, first of all, distributed team members tend to communicate less frequently than face-to-face teams (Sarker, Ahuja, Sarker, & Kirkeby, 2011). Moreover, when they do communicate, they are less likely to share common norms and perceived work procedures (Mesmer-Magnus et al., 2011). Therefore, confusion about the team's or the project's status due to communication constraints is often an issue in distributed teams. We also consider this applicable to the interaction between team members and their leaders.

In particular, communication not only fosters information exchange; it is also a foundation for building relationships and trust (Jimenez et al., 2017). When leading a distributed team, leaders have less day-to-day influence and less information about their followers' progress than in a face-to-face setting (Huang et al., 2010). In a distributed team environment where electronic communication is the main channel of interaction, leaders can face greater difficulties in assessing and developing suitable managerial interventions related to, for instance, conflict resolution, work motivation, performance, and trust (Dulebohn & Hoch, 2017). These are all leadership practices considered important for the development of high-quality LMX relationships (Martin et al., 2016). Seemingly, the way in which work relationships are effectively built and maintained via electronic communication could be different than for face-to-face communication (e.g., Hambley et al., 2007; Purvanova & Bono, 2009), especially for leaders building and facilitating work relationships within distributed teams (Dulebohn & Hoch, 2017; Eubanks et al., 2016; Malhotra, Majchrzak, & Rosen, 2007).

Transformational leadership is suggested as an effective leadership style for distributed teams because it is an active, relationship-oriented approach in which leaders exert influence by inspiring followers to focus on the team and team members, thus rising above their own immediate self-interest (Bell & Kozlowski, 2002). Indeed, previous research on distributed teams has demonstrated that transformational leadership is positively associated with follower motivation (Andressen, Konradt, & Neck, 2012), performance and work satisfaction (Purvanova & Bono, 2009), and a cooperative team climate (Huang et al., 2010). However, it is yet to be determined whether transformational leadership contributes to LMX quality in distributed settings. Many transformational leadership behaviors, such as articulating a vision and expressing individual considerations and confidence, largely rely on extensive, high-quality communication (Hambley et al., 2007). With the aforementioned communication challenges associated with electronic tools, we question how transformational leaders of distributed teams may build relationships with their followers.

In particular, due to the physical constraints and reduced communicational cues compared to face-to-face communication (Gilson et al., 2015; Klitmøller & Lauring, 2013), individuals who are highly dependent on electronic communication are often uncertain about their roles and tasks (Purvanova & Bono, 2009). In addition, because geographic dispersion prevents impromptu meetings, distributed team members also find it hard to relate to the role and tasks of their leaders (Liao, 2017). In other words, the constraints imposed by electronic dependence due to communication restraints and the spatial dispersion of team members may be likely to make it harder for leaders and team members to gain an overview of team processes, progress, and results (Dulebohn & Hoch, 2017). Therefore, electronic dependence could contribute to diminish the quality of the individual exchange relationships between transformational leaders and their distributed team members. Due to the inherent differences between face-to-face and computer-mediated communication, where the latter may lack

important visual and auditory cues, transformational leadership behaviors may be less effective in forming beneficial relationships with team members when dependence on electronic communication is high. Therefore, as illustrated in Figure 1, we hypothesize that:

Hypothesis 1. Electronic dependence will moderate the positive relationship between transformational leadership and LMX quality such that the relationship is less positive when electronic dependence is high.

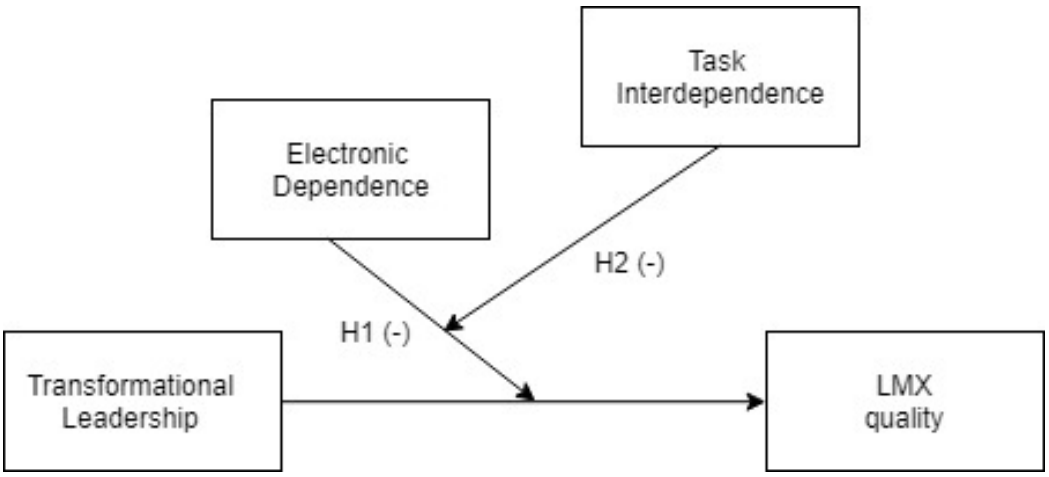


Figure 1. Two- and three-way interactions of transformational leadership, electronic dependence, and task interdependence.

2.2 Transformational leadership, electronic dependence and task interdependence: The three-way interaction in predicting LMX quality

The distributed work format creates new opportunities for flexibility in terms of mobility and arrangement of work, but individuals working together from different locations may still be highly dependent on each other in their work (Jimenez et al., 2017). For instance, projects may be arranged such that certain skills are required to complete specific tasks. If one individual possesses the skills required for the completion of the task, then other workers may not complete their own tasks before the first individual has completed his/hers (Y. Wang,

Gray, & Meister, 2014). Such "connectedness of jobs" (Morgeson & Humphrey, 2006, p. 1324), known as task interdependence, refers to the extent to which outcomes of a job are influenced by or depend on the actions of others (Kiggundu, 1983). Empirically, task interdependence has been found to be positively associated with various desirable work outcomes, such as increased cooperation and helping behaviors (De Jong, Van der Vegt, & Molleman, 2007), trust, effectiveness (Hertel, Konradt, & Orlikowski, 2004), and extra-role behaviors (Bachrach, Powell, Bendoly, & Richey, 2006; Ganesh & Gupta, 2010). Moreover, team performance depends on the extent to which team communication and task interdependence are in alignment (Rico & Cohen, 2005). This indicates that to understand the dynamics of a distributed team, it is important to investigate how team members interact to go about their work (Marlow, Lacerenza, & Salas, 2017). Research on LMX quality demonstrates that the dyadic relationships between leaders and their followers are influenced by team dynamics such as team coordination (Sui, Wang, Kirkman, & Li, 2016) and work values similarity across team members (Dose, 1999). We propose that the way in which team members develop the social exchange relationship with leaders is dependent on the way they interact with and the degree to which they are dependent on other team members.

Team members with high levels of task interdependence tend to interact more frequently and with higher quality (Orton & Weick, 1990; Weick, 1976) than team members who work independently of each other (Hollenbeck & Spitzmuller, 2012). This is particularly relevant for distributed teams because team members often perform their tasks in isolation. As such, task interdependence could be an important reason for them to initiate and to maintain interactions with those they work closely with (Hinds & McGrath, 2006). When the level of task interdependence increases, so do the dependencies and the coordination requirements among individuals, which can serve to tie team members more closely together (Burke et al., 2006). Moreover, interdependent coworkers should facilitate each other's work, communicate more

effectively and trust each other in fulfilling their mutual responsibilities (Liao, 2017). Therefore, team members are likely to be more attentive to other team members' actions and thoughts when their task interdependence is high (Van Der Vegt, Emans, & Van De Vliert, 2000).

However, interaction patterns among team members do not necessarily extend to the leader. Team members often perceive leaders to have different roles to play during the course of a teams' existence, and their importance to the team may vary depending on the team's structure and task focus (Bell & Kozlowski, 2002; Hollenbeck & Spitzmuller, 2012; Morgeson, DeRue, & Karam, 2010). A team with high levels of task interdependence may have different leadership needs than teams in which interdependence is low (Hinds & McGrath, 2006). If the team is highly interdependent with close ties among team members, they may be less dependent on the leader's input and directions as a reference to approach their work, and more motivated to engage in internal knowledge sourcing (Gray & Meister, 2004). Indeed, team members who identify each other's areas of expertise may rely more on each other for expert information than other sources of knowledge, such as the leader (Guo & Tang, 2017). In other words, team members may develop an internal knowledge base to reduce barriers for collaboration (Y. Wang et al., 2014), leaving the team members less reliant on their leader.

In these teams, the potential impact that transformational leadership may have merits exploration. Transformational leadership may serve to tie highly interdependent team members more closely together (e.g., Burke et al., 2006); however, the implications of these leader behaviors in connection to the relationship between the leaders and their individual members are less known. Leaders shape the work context of their followers through their own transformational behaviors (Podsakoff et al., 1996). Transformational leaders may set expectations of high performance, provide direction and a common model, or articulate a vision. However, in a team with high task interdependence, the team itself may set its own vision and

performance expectations (Bell & Kozlowski, 2002). Thus, it is likely that when individual members come across issues and questions, it would be natural for them to discuss them with their colleagues rather than with the leader (Hollenbeck & Spitzmuller, 2012).

Additionally, although research on transformational leadership suggests that teams in which leaders are supportive and confident in the abilities of their team members are more likely to succeed (Podsakoff et al., 1996), we argue that such support and confidence is harder to translate via electronic communication. The spatial dispersion and the dependence on electronic communication may prevent team members from orally approaching their leaders for quick informal feedback. Written feedback can be perceived as more formal than face-to-face communication, thus hindering such initiatives (Huang et al., 2010). As such, the leader may become less salient to the team. Indeed, followers need to perceive the relationship with their leader as rewarding in order to promote high-quality LMX relationships (Ilies et al., 2007; H. Wang et al., 2005)**.** If team members do not believe that the leader is contributing to the tasks at hand, they might feel a lesser need to reciprocate, thus diminishing the importance of the exchange relationship with the leader (Dulebohn et al., 2012)**.** We thus argue that cultivating high-quality LMX relationships should be more difficult to accomplish for a leader of a distributed team when both electronic dependence and task interdependence are high. Due to the leader's lack of face-to-face encounters with the team to enrich personal communication and the team's interaction structure, team members may perceive the relationship with the leader to be not only less salient, but even redundant. Therefore, as shown in Figure 1, we posit that:

Hypothesis 2. Task interdependence, electronic dependence, and transformational leadership will interact in predicting LMX such that the relationship between transformational leadership and LMX will be negative when task interdependence and electronic dependence are high.

3. METHODS

3.1 Sample – study 1 and study 2

To test our hypotheses, we conducted two independent field studies, namely Study 1 and Study 2. Study 2 was a replication study to strengthen the generalizability of our findings (Tsang & Kai-Man, 1999). In Study 1, the sample consisted of 79 employees from two Norwegian organizations (one from the IT industry and one from the manufacturing industry) that both operated with work units across geographically dispersed offices. A two-stage survey was sent to 300 employees from different work units of the two organizations. Of these, 93 participants (31%) had responded at Time 1 in March 2017. We then distributed the Time 2 survey one month later to the 93 participants, and 79 of them (85%) completed it. The final sample consisted of the 79 participants who completed both Time 1 and 2 surveys. Of the 79 participants, 61 were employees of 18 work units from the first organization. Two of the work units, with two and three members, respectively, were co-located. However, they were functional units that provided services to other work units that were geographically dispersed. For the remaining 16 work units, the members were located in 14 different offices across five countries. The 18 participants from the second organization were all from one work unit but working from six offices located in six different cities in Norway.

In terms of demographics, 49 (62%) were men and 30 (38%) were women. On average, they were 40.8 years old (*SD* = 10.2) and had been working for their current organization for 7.2 years (*SD* = 8.1) and with their current leaders for 3.0 years (*SD* = 2.8). Most of them (40.5%) had bachelor's degrees, followed by senior high school educations (21.5%), higher diploma educations (15.2%), master's degrees (13.9%), and junior high school educations (8.9%).

To facilitate communication across these locations, they relied on electronic communication tools (i.e., emails, teleconferencing, and collaborative software) to various degrees. The majority of them (68.4%) said that they relied to a great extent (7/7) on email for

communication in their daily work, while 27.9% had a moderate (5/7) to high (6/7) level of reliance. A total of 35.4% and 30.4% of participants said a high degree (6/7) of their daily work routines involved using teleconferencing and collaborative software, respectively, for communication, followed by 29.1% and 27.8% to a great extent (7/7) and 21.5% and 25.3% to a moderate degree (5/7).

Similar to Study 1, data for Study 2 was collected by a two-stage survey distributed to individuals working in geographically dispersed teams across 15 countries of an international firm. The Time 1 survey was distributed in March 2018 to 535 targeted participants, who were given three weeks to reply. Completed surveys were received from 153 (28.6%) participants. The Time 2 survey was distributed three months later to those 153 individuals who completed the Time 1 survey. Of those, 107 (69.9%) responded, resulting in a final sample consisting of individuals from 42 geographically dispersed teams (ranging between 1 and 8 participants from one team unit) located across 15 countries with a final response rate of 20.0%. We then assigned each participant to a unique team identification number.

Of the 107 respondents, 79 were male (73.8%) and 28 were female (26.2%). The majority of the participants had obtained bachelor's degrees (54.2%), followed by those who had master's degrees (29.0%), high school educations (10.3%), and diploma degrees (5.6%). One participant had a middle school education (0.9%). On average, they were 37.10 (*SD* = 11.12) years old, and their average tenure working for the current organization was 6.69 (*SD* = 8.38) years. In regards to their electronic communication dependence, many reported that, to a very great extent (5/5), they relied on collaborative software (41.8%), then teleconferencing (33.3%) and email (32.7%) to go about their work on a daily basis. Their high dependence on collaborative software might have also reflected that the participants of Study 2 were highly skilled IT software developers.

3.2 Measures

Transformational leadership was measured at Time 1 using Podsakoff and colleagues' (1996) 22-item transformational leader behaviors scale, which has been applied across cultures (e.g., Kirkman, Chen, Farh, Chen, & Lowe, 2009; Rubin, Munz, & Bommer, 2005; H. Wang et al., 2005). The scale consists of six dimensions, including articulating a vision, providing an appropriate model, fostering the acceptance of group goals, high performance expectation, providing individualized support, and intellectual stimulation. A sample item of this scale was "My leader inspires others with his/her plans for the future". Previous studies that have applied this scale as a unidimensional global measure of transformational leadership demonstrated satisfactory internal consistency with Cronbach's alphas (α) ranging from .87 to .95 (Pillai & Williams, 2004; Rubin et al., 2005; Schaubroeck et al., 2007). The scale had a Cronbach's alpha of .97 for Study 1 and .91 for Study 2.

We measured (Time 1) electronic dependence using Gibson and Gibbs' (2006) scale to capture the degree to which individuals were dependent on computer-mediated communication to stay in touch with their team members in their work. We first asked participants to recall their communication with their team members, including the leader. We then asked them to indicate their daily reliance on email, teleconferencing, and collaborative software as well as electronic communication in general. A sample item was "To what extent do you rely on e-mail in your daily work?" The scale had Cronbach's alphas of .71 for Study 1 and .63 for Study 2, which were similar to the Gibson and Gibbs' study (.72).

Task interdependence was measured at Time 1 by Morgeson and Humphrey's (2006) three-item scale for received task interdependence ($\alpha = .84$) derived from the larger measure "the Work Design Questionnaire." Participants were asked to indicate the extent to which they were dependent on other team members to complete their tasks. A sample item was "My job cannot be done unless others do their work." The reliabilities of this scale (Cronbach's alpha) were .91 for Study 1 and .78 for Study 2.

LMX quality was measured at Time 2 using Graen and Uhl-Bien's (1995) seven-item scale. Participants were asked to evaluate the quality of their relationships with their leaders based on listed statements by using a 7-point Likert scale. Higher scores indicated higher-quality relationships with leaders. A sample item was "How well does your leader recognize your potential?" The scale had a Cronbach's alpha of .91 for Study 1 and .88 for Study 2, which were consistent with previous research findings (Graen & Uhl-Bien, 1995).

We also included several control variables. In both Study 1 and Study 2, we controlled for demographic variables, including age, gender, and education, because they could potentially account for variance in a work-related assessment (Turban & Jones, 1995). Age was measured in true number and gender was measured using categories, where 0 represented male and 1 represented female. For education, we asked the participants to indicate their educational attainment, ranging from 1 (junior high school) to 6 (doctorate). In addition, we controlled for individual members' organizational tenure and tenure with their leaders, which were measured in true numbers. These were taken into account as proxies for job-related knowledge that the individuals may have acquired about their leaders and the organizations (Ng & Feldman, 2010). We also included self-rated team performance using the scale developed by Gardner (2012). This is because the way individual members see their team performance influences how they relate to their teams and the team processes (Gardner, 2012), which may alter their need for leadership (Spreitzer, Cohen, & Ledford, 1999).

Last, but not least, although we measured the predictor variables and the outcome variable in two separated time points, we applied a marker variable test to further minimize the potential threats of common method biases (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). To do so, we included an extra variable—an individual fixed mindset—in the model that was least correlated to any of the predictor and outcome variables. For Study 2, besides those that were included in Study 1, we also included job satisfaction using the 3-item general

job satisfaction scale developed by Quinn and Shepard (1974) with a Cronbach's alpha (α) of .86; perceived isolation using the 4-item scale developed by Connaughton and Daly (2004) (α = .87); team coordination using 5 items from Lewis's (2003) Transactive Memory System Scale (α = .75), and job crafting using the 5-item measure developed by Leana, Appelbaum, and Shevchuk (2009) with a Cronbach alpha of .74. These were included to cover a wider range of marker variables to remedy potential common method biases.

3.3 Analytic procedure

This study focused on how perceived leader behaviors (i.e., transformational leadership) and certain team processes (i.e., electronic dependence and task interdependence) may influence how individuals evaluate their leaders and subsequently the quality of their relationship with the leaders (i.e., LMX quality). Because some of the participants in the sample were from the same teams and shared the same leaders, even though all constructs were operated at the individual level, we considered the fact that the potentially shared variance between the teams could bias the standard error estimate (Hox, 2010). Therefore, we assessed the degree of interdependence by examining the intra-class correlations of transformational leadership and LMX at the individual level (Snijders & Bosker, 2012). The results indicated no significant unexplained variances between teams for LMX (Study 1: p = .67; Study 2: p = .39) and transformational leadership (Study 1: p = .21; Study 2: p = .62) with relatively small intra-class correlations (Study 1: ICCs = .07 and .15 respectively; Study 2: ICCs= .08 and .04, respectively). However, we applied multi-level analyses to test our hypotheses, as it provides more conservative estimates (Snijders & Bosker, 2012).

The moderating hypothesis (H1) will be supported if the interaction between transformational leadership and electronic dependence and between transformational leadership and task interdependence provide significant additional explained variance to the model and the regression coefficients are negative and significant. Dawson and Richter's

(2006) procedure was applied to examine the simple slopes at high and low levels of electronic dependence. In addition, the three-way interaction hypothesis (H2) will be supported if the three-way interaction term (i.e., transformational leadership x electronic dependence x task interdependence) is significant and provides additional explained variance (Dawson & Richter, 2006). Moreover, the slope between transformational leadership and LMX will be significantly negative while other slopes are positive when electronic dependence and task interdependence are high.

4. RESULTS

4.1 Study 1

Table 1 displays the means, standard deviations, correlations, and reliability coefficients for all of the measures in Study 1. We conducted multi-level analyses to examine the relationships between transformational leadership and LMX when the moderators (i.e., electronic dependence and task interdependence) were introduced. We performed an exploratory factor analysis (EFA) to examine the factor structure of the three variables studied, namely transformational leadership, task interdependence, and LMX. Electronic dependence was not included in the EFA because the measure of electronic dependence is additive in nature and may not necessarily hold a cohesive factor structure. Following Tabachnick and Fidell's (2007) cut-off criteria for items with different frequency distributions, the EFA results indicate a satisfactory three-factor structure with factor loadings ranging from just below fair (.44) to excellent (.94).

H1 predicts that the positive relationship between transformational leadership and LMX will be weaker when electronic dependence is high rather than when it is low. The results shown in Table 2 indicate that while transformational leadership had a positive (β = .38, *SD* = .13) and significant ($p < .01$) relationship with LMX, electronic dependence did not have a direct relationship with LMX. However, the interaction between transformational

leadership and electronic dependence was negative (β = -.57, *SD* = .18) and significantly related to LMX with a *p*-value less than .01. We further assessed the simple slopes and plotted the relationships, as depicted in Figure 2, when electronic dependence was high versus when it was low (Dawson & Richter, 2006). As expected, the simple slope between transformational leadership and LMX was positive (β = .92) and significant ($p < .01$) when electronic dependence was low. However, although the transformational leadership–LMX relationship was slightly negative, it was not significant when electronic dependence was high. H1 was therefore supported in Study 1.

Table 1. Study 1. Descriptive statistics correlations and reliability coefficients

Variables	Means	SD	1	2	3	4	5	6	7	8	9	10	11
1. Age[1]	40.79	10.25	-										
2. Gender[1,a]	0.38	0.49	.07	-									
3. Education[1]	3.29	1.21	-.15	.09	-								
4. Organizational tenure[1]	7.24	8.08	.55**	.23	-.11	-							
5. Tenure with leader[1]	2.97	2.83	.09	-.20	-.21	.12	-						
6. Subjective team performance[1]	5.56	0.90	-.26	.14	-.20	-.07	-.21	-					
7. Fixed mindset[1]	3.07	1.40	.12	.07	-.00	.40**	-.03	.21	(.86)				
8. Transformational leadership[1]	5.00	1.05	.01	.15	-.01	.05	.04	.40**	-.21†	(.97)			
9. Electronic dependence[1]	5.93	0.95	.16	.25*	.33**	.18	-.24*	.19	.04	.38**	(.71)		
10. Task interdependence[1]	5.40	1.34	-.15	-.10	.11	.00	.08	-.28*	-.13	.26*	.13	(.91)	
11. Leader–member exchange Quality[2]	5.24	1.07	-.27*	-.03	-.01	-.21	.15	.43**	-.27*	.55**	.12	.02	(.91)

Note. Cronbach's alphas are displayed on the diagonal. $N = 79$. † $p < .10$. * $p < .05$. ** $p < .01$. [1] represents variables measured at Time 1. [2] represents variables measured at Time 2. [a]Gender was coded using 0 as male and 1 as female.

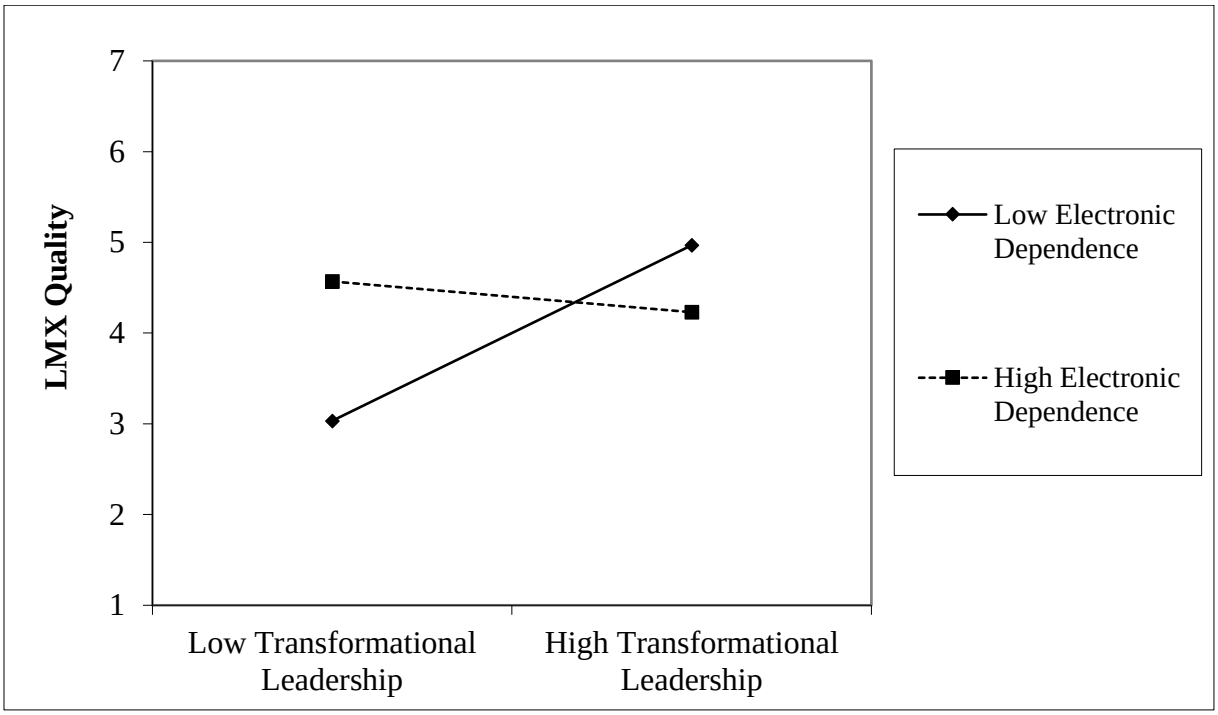
Table 2. Study 1. Two-way and three-way multilevel regression analyses and slope difference results

Variables	LMX Quality			
	Model 1		Model 2	
	fixed effect estimates	standard error	fixed effect estimates	standard error
Intercept	2.55*	(1.34)	4.22**	(1.22)
Age	-.02	(.01)	-.02†	(.01)
Gender	-.16	(.22)	-.24	(.20)
Education	.12	(.09)	.08	(.09)
Organizational tenure	-.00	(.02)	-.01	(.02)
Tenure with leader	.09*	(.04)	.08*	(.04)
Subjective team performance	.60*	(.18)	.37*	(.17)
Fixed mindset	-.22*	(.09)	-.19*	(.08)
Transformational leadership (*TL*)	.43**	(.13)	.38**	(.13)
Electronic dependence (*ED*)			.21	(.16)
Task interdependence (*TI*)			-.15†	(.09)
TL x *ED*			-.57**	(.18)
TL x *TI*			.06	(.07)
ED x *TI*			.16	(.13)
TL x *ED* x *TI*			-.23*	(.09)
Model Deviance (AIC)	131.92		129.07	
Simple slopes	Gradient of simple slope		*t*-value of simple slope	
Low ED	0.92		5.34**	
High ED	-0.16		-0.68	
Pair of slopes			*t*-value for slope difference	
High *ED* high *TI* vs High *ED* low *TI*			-2.22*	
High *ED* high *TI* vs Low *ED* high *TI*			-3.65**	
High *ED* high *TI* vs Low *ED* low *TI*			-3.41**	

Note. N = 79; Fixed effect estimates and their standard errors are shown in each equation;

† p <.10. * p <.05. ** p < .01.

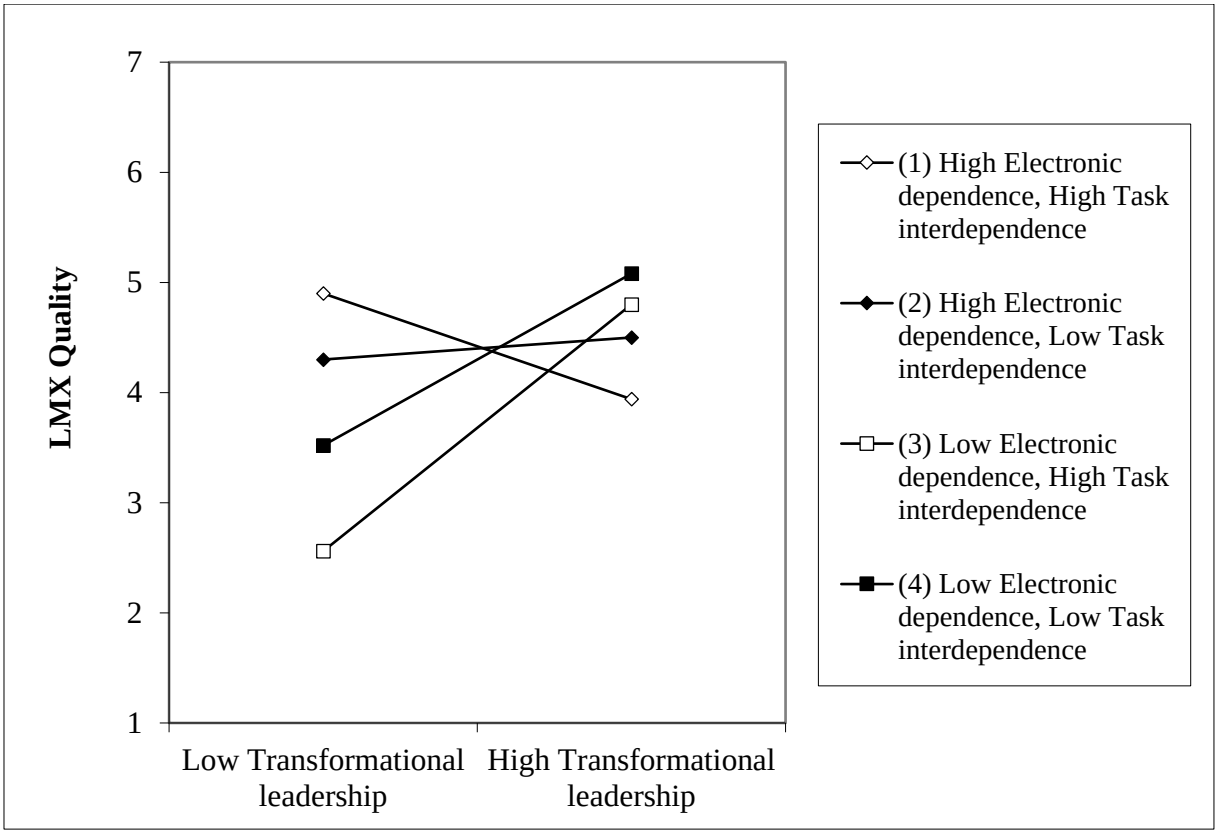
Figure 2. Study 1. Two-way interaction between transformational leadership and electronic dependence in predicting LMX quality



H2 predicts that the positive relationship between transformational leadership and LMX will become negative when electronic dependence and task interdependence are high. First, we assessed the three-way interaction term (i.e., transformational leadership x electronic dependence x task interdependence), which was negative (β = -.23, *SD* = .09) and significant ($p < .05$), as displayed in Table 2. Next, we plotted the conditioned relationships. As illustrated in Figure 3, the transformational relationship–LMX relationship appeared to be negative when electronic dependence and task interdependence were high, while the relationship in other conditions appeared to be positive. Therefore, we conducted the slope difference test, as shown in Table 2. The slope value when electronic dependence and task interdependence were high was significantly different from the slope values in the other three conditions, namely high electronic dependence and low task interdependence, low electronic

dependence and high task interdependence, and low electronic dependence and low task interdependence. H2 was therefore supported.

Figure 3. Study 1. Three-way interactions between transformational leadership, electronic dependence, and task interdependence in predicting LMX quality



4.2 Study 2

Similar to Study 1, we conducted analyses for descriptive statistics and multi-level regression to test our hypotheses. Table 3 displays the means, standard deviations, correlations, and reliability coefficients for all of the measures in Study 2. We next conducted multi-level analyses to examine the hypothesized relationships between transformational leadership and LMX when the moderators (i.e., electronic dependence and task interdependence) were introduced, and the results are presented in Table 4. Similar to the results of Study 1, as shown in Table 4-Model 1, transformational leadership measured at

Time 1 was positively associated with LMX quality reported at Time 2 (β = .58, *SD* = .18, *p* < .01).

For H1, we regressed LMX quality on transformational leadership, electronic dependence, task interdependence, and their two- and three-way interaction terms as shown in Table 4-Model2. The two-way interaction between transformational leadership and team members' electronic dependence was negative as expected, but it was not significant (β = -.12, *SD* = .22, *p* > .05). Thus, the results of Study 2 did not support H1. However, for H2, the results of Study 2 seem to support the results derived from Study 1. First, the directions of all predictors and their respective two- and three-way interaction terms (i.e., Table 4-Model 2) imitated the pattern we found in Study 1 (i.e., Table 2-Model 2). Second, the three-way interaction term (i.e., transformational leadership x electronic dependence x task interdependence) was negative and significant as posited (β = -.59, *SD* = .28, *p* < .05). We further plotted the conditioned relationship, as depicted in Figure 4. The relationship between transformational leadership and LMX quality in the condition when electronic dependence and task interdependence were high was significantly more negative than in the conditions when electronic dependence was high and task interdependence was low (t = -2.15, *p* < .05) and when electronic dependence was low and task interdependence was high (t = -1.99, *p* < .05). On the other hand, the slopes were statistically indifferent when compared the condition in which electronic dependence and task interdependence were both high with the condition in which they were both low (t = -.37, *p* > .10). However, from the observations of the plot (Figure 4), the slope between transformational leadership and LMX quality appeared to be most negative when electronic dependence and task interdependence were both high as hypothesized. H2 is therefore also supported in Study 2.

Table 3. Study 2. Descriptive statistics correlations and reliability coefficients

Variables	Means	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Age[1]	37.37	11.50	-																				
2. Gender[1,a]	0.23	0.42	.15	-																			
3. Education[1]	4.59	3.20	.21*	.04	-																		
4. Lithuania[1]	0.23	0.42	-.37**	-.07	-.08	-																	
5. Latvia[1]	0.15	0.36	-.22**	-.10	.16†	.23**	-																
6. Romania[1]	0.03	0.18	-.13	.16*	-.01	-.10	-.08	-															
7. Norway[1]	0.25	0.43	.27**	-.06	-.01	-.31**	-.24**	.11	-														
8. Sweden[1]	0.14	0.35	.22**	.22**	.02	-.22**	-.17*	.08	.24**	-													
9. Finland[1]	0.06	0.24	-.03	-.07	-.07	-.14†	-.11	.05	-.14†	-.10	-												
10. The Netherlands[1]	0.03	0.16	.16†	.01	.01	-.09	-.07	.03	-.09	-.07	-.04	-											
11. Denmark[1]	0.03	0.16	.24**	.11	-.03	-.09	-.07	.03	-.09	-.07	-.04	-.03	-										
12. Other countries[1]	0.07	0.26	.01	-.03	.00	-.15†	-.12	.05	-.16*	-.11	-.07	-.05	-.05	-									
13. Perceived isolation	2.23	0.90	.18*	.06	-.03	-.15	-.18*	.11	.14	.27**	-.13	-.01	.00	.12	(.87)								
14. Fixed mindset[1]	2.67	0.75	-.17†	-.09	-.13	-.03	.11	.06	-.13	-.21	.12	.08	-.04	.13	-.05	(.79)							
15. Job satisfaction[1]	3.96	0.67	-.07	-.19†	-.03	-.10	.01	.32	-.05	-.02	.16	-.05	.03	.10	-.34**	.02	(.86)						
16. Team coordination[1]	3.62	0.63	-.14	-.16†	.02	.03	-.11	20*	.02	-.29**	.05	.04	-.05	-.02	-.52**	.09	.44**	(.75)					
17. Job crafting[1]	2.63	0.72	-.02	-.01	.08	.03	-.17†	.03	.04	.03	.03	-.01	-.07	.04	.10	-.05	.10	.02	(.74)				
18. Transformational leadership[1]	3.45	0.55	-.27**	-.03	.02	.06	.12	20*	-.14	-.13	.07	.05	.10	-.15†	-.44**	.09	.27*	.45**	-.14	(.91)			
19. Electronic dependence[1]	4.09	0.67	.12	.11	04	-.12	-.12	.03	.25**	.05	-.04	.09	-.09	-.05	.03	.01	.05	.12	.13	.17†	(.63)		
20. Task interdependence[1]	3.53	0.76	.19*	.24**	.09	-.05	-.18*	.09	.16†	.17	.06	.07	-.09	-.05	.26**	-.13	-.19†	-.25**	.02	-.09	.19*	(.78)	
21. Leader–member exchange Quality[2]	3.71	0.69	-.15	-.18†	.05	.06	-.05	.05	-.16†	-.08	.14	.14	.02	.15	-.10	.17	.34**	.16	.21†	.46**	.24*	-.15	(.88)

Note. Cronbach's alphas are displayed on the diagonal. $N = 107$. † $p < .10$. * $p < .05$. ** $p < .01$. [1] represents variables measured at Time 1. [2] represents variables measured at Time 2. [a]Gender was coded using 0 as male and 1 as female.

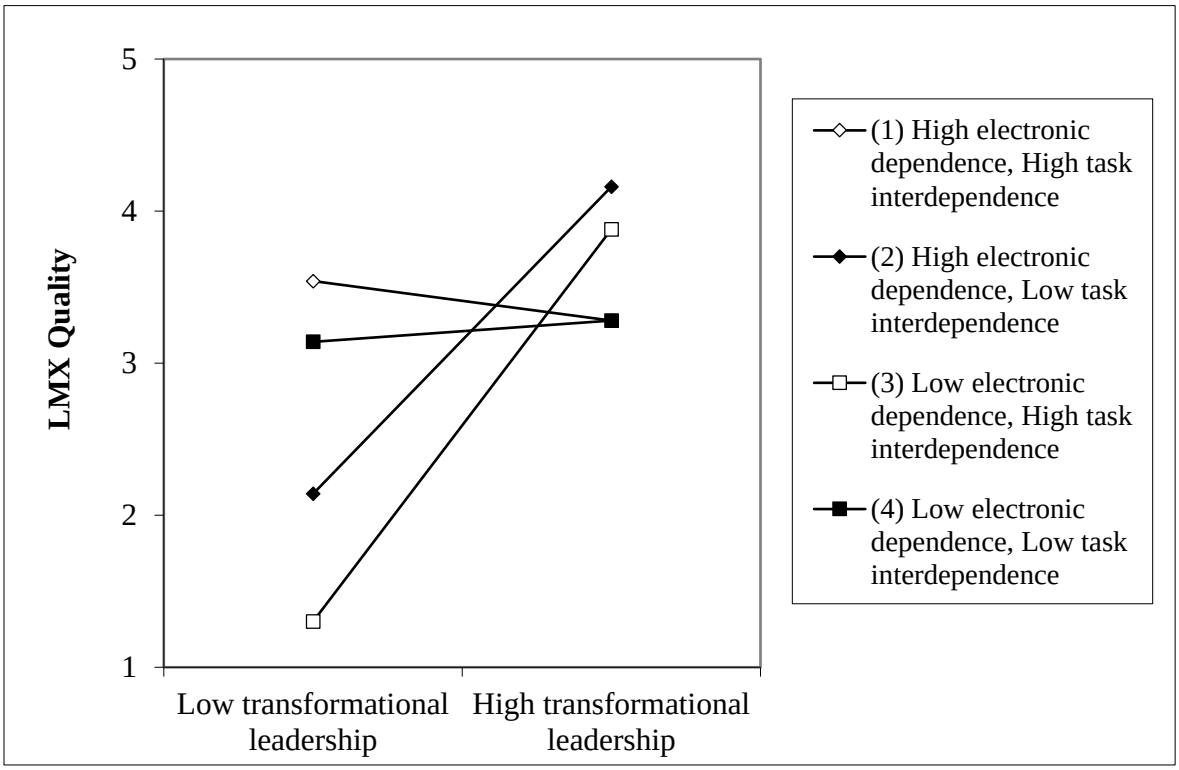
Table 4. Study 2. Two-way and three-way multilevel regression analyses and slope difference results

Variables	LMX Quality			
	Model 1		Model 2	
	fixed effect estimates	Standard error	fixed effect estimates	Standard error
Intercept	3.04**	(.87)	3.09**	(.86)
Age	-.01	(.01)	.01†	(.01)
Gender	-.30†	(.15)	-.33	(.14)
Education	.05	(.07)	.02	(.06)
Lithuania	-.35	(.24)	-.40	(.24)
Latvia	-.61*	(.28)	-.60*	(.28)
Romania	-.34	(.44)	-.39	(.42)
Norway	-.14	(.26)	-.13	(.26)
Sweden	-.19	(.29)	-.28	(.28)
Finland	-.20	(.30)	-.20	(.30)
The Netherlands	.21	(.38)	.09	(.35)
Denmark	.01	(.41)	.05	(.42)
Perceived isolation	.05	(.08)	.11	(.08)
Fixed mindset	.05	(.08)	.07	(.07)
Job satisfaction	.28**	(.09)	.31**	(.09)
Team coordination	-.16	(.09)	-.22†	(.12)
Job crafting	.11	(.08)	.12	(.08)
Transformational leadership (TL)	.58**	(.14)	.56**	(.14)
Electronic dependence (ED)			.19*	(.09)
Task interdependence (TI)			-.09	(.08)
TL x *ED*			-.12	(.22)
TL x *TI*			.02	(.18)
ED x *TI*			.22†	(.12)
TL x *ED* x *TI*			-.59*	(.28)
Model Deviance (AIC)	163.57		162.58	
Simple slopes	Gradient of simple slope		*t*-value of simple slope	
Low ED	0.64		2.83**	
High ED	0.48		2.60**	
Pair of slopes			*t*-value for slope difference	
High *ED* high *TI* vs High *ED* low *TI*			-2.15*	
High *ED* high *TI* vs Low *ED* high *TI*			-1.99*	
High *ED* high *TI* vs Low *ED* low *TI*			-0.39	

Note. N = 107; Fixed effect estimates and their standard errors are shown in each equation;

† p <.10. * p <.05. ** p < .01.

Figure 4. Study 2. Three-way interactions between transformational leadership, electronic dependence, and task Interdependence in predicting LMX quality



5. DISCUSSION

With this research, we examined how the degree of electronic dependence and task interdependence moderated the relationship between transformational leadership and the LMX relationship in distributed teams. Results from Study 1 and Study 2 indicate that transformational leadership was positively related to LMX quality. While the results from Study 2 were partially supportive, results from Study 1 support that electronic dependence negatively moderated the relationship between transformational leadership and LMX quality, such that transformational leadership was more positively related to LMX quality when electronic dependence was low than when it was high (H1). In addition, our findings from both Study 1 and Study 2 suggest that transformational leadership was most ineffective in building a high-quality LMX relationship when electronic dependence and task interdependence were high (H2), as expected.

The findings of the present study contribute to the literature on distributed leadership, as well as the literature on transformational leadership and LMX quality, by examining the conditions under which transformational leadership may be less effective in building high-quality leader-follower relationships. Such an investigation is important because feelings of isolation and dis-identification resulting from a lack of physical interactions in distributed teams are thought to pose greater leadership challenges than in traditional teams (Dulebohn & Hoch, 2017; Liao, 2017). Through this study, we contribute to the call for more knowledge about how organizations can adapt to digitization through more effective leadership (Colbert et al., 2016). Our findings contribute to the distributed team leadership research in two distinct ways.

First, LMX quality has proven to be one of the most predictive leadership factors influencing followers' work outcomes (Dulebohn et al., 2012; Huettermann, Doering, & Boerner, 2014; Rockstuhl, Dulebohn, Ang, & Shore, 2012). However, nurturing such a high-quality exchange relationship can be challenging for distributed teams, where the impoverished team environment, with a lack of material, social and symbolic cues, may hinder a sense of belonging (Gajendran & Joshi, 2012). In particular, we argue that dependence on electronic communication tools in the distributed setting constrains both communication quality and frequency between leaders and team members, both said to enhance leader–follower relationship quality (Kacmar, Witt, Zivnuska, & Gully, 2003). In line with this argument, our findings from Study 1 suggest that the positive relationship between transformational leadership and LMX is weaker when electronic dependence is high. This implies that computer-mediated communication presents an obstacle for leaders seeking to develop a high-quality exchange relationship with their followers. Although the two-way interaction was not significant in Study 2, it was negative as we hypothesized, providing marginal support. In comparison to the sample in Study 1, the distributed teams in Study 2 were more spread out in terms of country locations.

The team dynamics may therefore differ. Future research is recommended to investigate this further.

Our findings support previous research that points to the negative moderating effects of electronic dependence in distributed teams (e.g., Daim et al., 2012; Huang et al., 2010; Klitmøller & Lauring, 2013). Our findings contribute specifically to the literature by demonstrating that electronic dependence may reduce the quality of the relationship between leaders and followers. In our case, it seems that electronic dependence can impose a less favorable environment for transformational leaders to develop high-quality LMX relationships with their followers. However, is it the usage of electronic communication tools *per se* that leads to the reduced relationship quality? In this study, emphasis has not been on the type of communication tools, but rather the distributed setting that necessitates electronic dependence for communication altogether. Given that communication quality (Daim et al., 2012; Mesmer-Magnus et al., 2011) and frequency (Sarker et al., 2011), can be affected by electronic communication, transformational leaders should consider both their communication frequency with their followers, as well as how their own communication may translate in distributed settings. Indeed, previous research on the emergence of transformational leadership in distributed teams indicates that the quality of written rhetoric, such as elaborative ability and expression complexity, matters (Balthazard, Waldman, & Warren, 2009). That is, it is likely that individuals identify their leaders as transformational according to the leaders' written communication skills. Previous studies have also provided support for the positive relationship between communication frequency and the building and maintaining of trust in distributed teams (Sarker et al., 2011), which is an important element in transformational leadership. Accordingly, leadership communication appears to be vital for transformational leaders to develop high-quality LMX. Nevertheless, the medium to strong positive correlations between electronic dependence and LMX found in Study 1 and 2 imply that, in general, distributed teams

benefit from having more, rather than less communication, even it is via computer-mediated means in building LMX.

Second, our findings shed light on the importance of taking into account task interdependence and team interaction structure in distributed leadership research. Specifically, our results demonstrate that when electronic dependence and task interdependence are both high, it is least likely that transformational leadership may nurture high LMX quality. In such conditions, the team's structural environment may not particularly encourage interaction. However, distributed team members may still need to develop a good exchange relationship with their leaders in order to gain access to the necessary information and resources needed to overcome role ambiguity and feelings of isolation and dis-identification, which are common challenges in distributed teams (Gajendran & Joshi, 2012).

Based on our results, however, it appears that transformational leaders have less success in developing LMX quality with their followers when the teams are already coping with these issues by forming tighter interaction patterns within the team (Orton & Weick, 1990). Indeed, members who believe their teams to be stable and long-lasting develop more trust in the team as a whole and commit more to the team's goal attainment (Haines, 2014). In other words, leaders may approach relationship building via different means instead of only focusing their transformational leadership style. From the results of both studies, distributed teams seemed better off in experiencing higher quality relationship with their leaders when they were satisfied with their jobs and their team performance. These alternative sources in building reciprocal relationships are indeed in line with previous research (Volmer et al., 2011). Our findings are thus important, as previous research has provided strong support for the positive relationship between transformational leadership and LMX quality in traditional settings (e.g., Martin et al., 2016). Especially, according to the medium-strong positive correlations between electronic dependence and transformational leadership in Study 1 and 2, leaders in out studies tended to

display more transformational leadership when the teams were more highly relying on electronic communication. Our findings therefore have important theoretical contributions, but also practical ones as we discuss next.

Overall, the findings of this research point to implications for organizations and leaders that wish to emphasize relationship building with their employees while making use of distributed teams. To counter the negative effect that high electronic communication dependence has on the relationship between transformational leadership and LMX quality, leaders should make efforts to ensure that a proper introductory meeting is conducted face-to-face at the outset of the teamwork, as early leader–follower interactions are important for subsequent LMX quality (Nahrgang, Morgeson, & Ilies, 2009). If it is not possible to arrange that all team members meet in person, a richer media videoconferencing tool with both visual and audio capabilities can be better than no meeting at all (Huang et al., 2010).

Moreover, as shown in our results, electronic communication was positively related to LMX, meaning that firms can consider various types of leadership communication training to better prepare leaders for distributed team communication and leadership. As leader communication in traditional settings has been shown to be an important driver of follower engagement, trust, satisfaction, and knowledge sharing (De Vries, Bakker-Pieper, & Oostenveld, 2010; Rees, Alfes, & Gatenby, 2013) and the formation of leader–member relationships (Riggio & Lee, 2007), it is also likely that leaders may benefit from specialized training for distributed team communication.

Our results suggest that the leaders of distributed teams are at risk of being redundant if the team members get by on their own and the LMX relationships are not deemed important by the followers. From a practical perspective, leaders should adapt their own behaviors to assert their values. Besides the suggestions for the choice of electronic tools discussed above, another recommendation would be for leaders to show the team co-presence (although not physically)

by taking an active role in team processes, such as initiating group communication, idea discussion, problem solving, etc. By showing a virtual presence and interest, leaders may stay closer to the group and show themselves as important and salient group members who may make a valuable contribution to the team by offering guidance.

5.3 Limitations and future research

When interpreting the results of this study, some limitations must be taken into account. First, although both of our studies employ a cross-lagged design as recommended by Podsakoff, MacKenzie, & Podsakoff (2012), the current sample and methods employed leave us in no position to make causal claims or refute reverse causality between our independent and dependent variables. Future research employing an experimental design is needed to test the causal relationship between transformational leadership and LMX quality (Pedhazur & Schmelkin, 1991; Shadish, Cook, & Campbell, 2002).

A second limitation related to the use of self-reported data concerns the threat of potential common method biases (Podsakoff et al., 2012). However, the study is based on the assumptions of individual perceptions of the constructs under investigation; accordingly, self-reporting measures were deemed necessary to capture the perceptions of the constructs of interest. To reduce the risk of common method bias, we employed, as recommended, a two-stage survey with a time lag of one month in which the independent and dependent variables were measured at different points in time (Podsakoff et al., 2012).

Further, the generalizability of our results is limited by the relatively small sample size, which can limit the accuracy and stability of the estimates (Shadish et al., 2002). To strengthen the generalizability, we conducted a replicate study, and the results were relatively similar. As our sample consisted of employees from three Norwegian organizations, these results are not generalizable to other cultural contexts. Nevertheless, our sample includes employees from three different organizations geographically dispersed across 25 locations, which serves to

strengthen the external validity compared to research that focuses on one single organization and location (Pedhazur & Schmelkin, 1991); future studies should replicate this research in a larger sample among different organizations and cultures to provide more evidence of generalizability.

Our findings indicate that in distributed teams, the relationship between transformational leadership and LMX quality is affected by other task, organizational or employee characteristics. With regard to communication media, previous research indicates that the type of media (Klitmøller & Lauring, 2013) and media richness (Huang et al., 2010) may affect communication quality and information sharing in different ways (Mesmer-Magnus et al., 2011; Walvoord et al., 2008). For instance, Huang and colleagues (2010) examined the moderating effect of media richness on the relationship between leadership style and cooperative climate in distributed teams. They found that the relationship was moderated by media richness such that transformational leadership was more positively related to a cooperative climate when media richness was low (e.g., e-mail) compared to high (e.g., videoconferencing). The cooperative climate, in turn, led to greater discussion satisfaction and quicker task completion (Huang et al., 2010). It appears that when media richness is high, it is easier for team members to communicate effectively and create a common understanding and a supportive environment. This may leave the team less in need of transformational leader behaviors to facilitate its teamwork (Huang et al., 2010). However, similar to other research on transformational leadership in distributed teams (Hoch & Kozlowski, 2014; Purvanova & Bono, 2009), Huang et al. (2010) did not address the implications of media richness on the relationship between leaders and followers.

In this study, we did not emphasize the differences in richness of the electronic communication tools used. The measure that we used for electronic dependence (Gibson & Gibbs, 2006) capture frequency of usage only. Although we reported the level of reliance on

the different tools, the hypotheses were tested based on the overall electronic dependence, and may thus not fully capture the differences between the tools used. Moreover, the original items by Gibson and Gibbs (2006) do not specify whether the technologies are used for communication within the organization or with external stakeholders. In our survey we therefore asked participants to consider their usage of the tools specifically for communication with their team, including the leader.

In light of these notions, future research should examine how the relationship between leadership style and LMX quality may be moderated differently depending both on the richness in, and frequency of usage of the different electronic communication tools. Some previous research suggests that correctly applied technology in which communication is emphasized can improve leader–follower interactions but lessen the effectiveness of transformational leadership through flexibility and team collectiveness (Avolio & Kahai, 2003; Kahai, Sosik, & Avolio, 2003; Walvoord et al., 2008). This represents a potentially promising avenue for future research. As the use of distributed teams and other virtual collaboration forms continue to expand (Colbert et al., 2016), it is important to build knowledge on how traditional leader behaviors may work differently in new contexts.

As a concluding remark, our study adds to the growing body of literature on distributed leadership by demonstrating that the mechanisms by which leaders and employees relate to and reciprocate among one another in distributed settings may be different from what has been established through research in traditional, face-to-face settings. The digital future of work is already upon us, and with it comes exciting avenues for research on leadership and management practices of the digital age.

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