VIRTUAL TEAM LEADERSHIP: A FUNCTIONAL PERSPECTIVE

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ABSTRACT

Research on virtual team leadership has largely relied on theories developed for dyadic leader-member relationships or focused on the informal form of authority executed by team members, leaving many questions regarding the role of formal team leaders unanswered. Integrating Bell and Kozlowski's (2002) and Hill and Bartol's (2016) theoretical perspectives with the functional leadership framework, I posit that formal team leaders should delegate part of their responsibilities to members and enable them to self-manage. To do so, formal team leaders might need to perform specific guiding and empowering functions. In Study 1, I examine the factor structure of the leadership functions and find support for the model consisting of the guiding and empowering factors. In Study 2, I test the hypotheses in a scenario experiment. The results suggest that the leadership functions are positively associated with participants' leadership emergence, and the relationship is mediated by psychological empowerment.

BIOGRAPHICAL SKETCH

Thao Nguyen was born and raised in Ho Chi Minh City, Vietnam. She received a BA in International Relations from Vietnam National University and graduated *valedictorian* in the major in 2014. She started her Ph.D. in Human Resource Studies at the Industrial & Labor Relations School, Cornell University in 2019. Her research interests encompass virtual work arrangements and team leadership.

To my dearest family.

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Introduction

The last few years have witnessed an unprecedented escalation in the use of virtual teams around the world. Once an outlier trend only seen in technology companies, virtual teams have quickly transformed into a necessity in nearly every industry and are expected by many to be here to stay. Concurrent with the growth of virtual teams, considerable attention has been paid to the changing context of leadership, in which leaders experience physical separation from their teams and rely on technology to interact with their followers (see Bell, McAlpine, & Hill, 2019 for a review). Particularly, researchers and practitioners alike have postulated that leading virtual teams is more challenging than leading in a traditional face-to-face setting since virtual leaders have to cope with higher levels of uncertainty and ambiguity (Duarte & Snyder, 2006; Jarvenpaa & Leidner, 1999). At the same time, the role of leadership has been argued to be crucial to reduce coordination and motivation losses inherent in a distributed working environment (Bell & Kozlowski, 2002; Malhotra, Majchrzak, & Rosen, 2007; Martins, Gilson, & Maynard, 2004). As Blackburn, Furst, and Rosen (2003, p. 102) state, "The number one key success factor for virtual teams is strong leadership."

Yet, what should virtual team leaders do to be effective? Various leadership models have been established to answer this question. A majority of them, however, have been derived from theories originally developed for the dyadic leader-member relationship rather than the relationship between the leader and the team as a whole (Kirkman, Gibson, & Kim, 2012). While dyadic and team leadership in the virtual

environment are likely to share a number of characteristics, such an approach might result in a fairly incomplete account of the variety of behaviors that virtual team leaders need to perform to help their teams succeed (Bell et al., 2019; Kirkman et al., 2012). Other studies, albeit utilizing team-centric leadership theories, have primarily highlighted the role of leadership emerging from members, especially arguing that this form of informal authority exceeds the effects of formally designated leadership in predicting virtual team effectiveness (Hoch & Kozlowski, 2014; Johnson, Suriya, Yoon, Berrett, & La Fleur, 2002). Questions regarding the role of formal leadership in virtual teams and its impact are, therefore, still left largely unanswered.

This present study is designed to address this theoretical gap. In particular, my main goal is to develop a model that aims to elaborate on *what* formal leaders in virtual teams should do to effectively perform their role and *how* the formal leadership functions influence team member outcomes.

To answer the 'what' question, I integrate Bell and Kozlowski's (2002) and Hill and Bartol's (2016) contingency models of virtual leadership with functional leadership theory (Hackman & Wageman, 2005; Lord, 1977; McGrath, 1962; Morgeson, 2005; Morgeson, DeRue, & Karam, 2010). I first echo Bell and Kozlowski's (2002) and Hill and Bartol's (2016) main premise by arguing that the real challenges of coordinating and monitoring task activities in a distributed environment require formal leaders to delegate part of the leadership responsibilities to team members and enable them to self-manage. To achieve such goals, according to Bell and Kozlowski (2002), formal leaders should establish structures and routines

that help members regulate their own behaviors. Hill and Bartol (2016), on the other hand, point out the importance of formal leaders' creating an empowering environment where members are encouraged to leverage the power afforded to them. Despite their seemingly different standpoints, these approaches are not mutually exclusive and can be combined to develop a more comprehensive model of virtual team leadership. That is, virtual team members need a clear guiding system to alleviate the ambiguity of the environment as well as supportive social cues that legitimize and reinforce the exercise of distributed authority. As a next step, I draw on functional leadership theory (Hackman & Wageman, 2005; Lord, 1977; McGrath, 1962; Morgeson, 2005; Morgeson et al., 2010) to identify specific functions formal leaders might need to perform to both guide and empower their virtual teams. Functional leadership is a team-centric leadership theory that argues for congruence between leadership and task environments rather than centering on fixed leadership behaviors (Hackman & Wageman, 2005; Lord, 1977; McGrath, 1962; Morgeson, 2005; Morgeson et al., 2010). Given this flexibility, functional leadership can be considered a particularly apt framework to study formal leadership in non-traditional settings like virtual teams.

To address the 'how' question, I focus on psychological empowerment as a potential mediator between the formal leadership functions and the leadership emergence of team members. Psychological empowerment refers to individuals' perceptions of their capability and autonomy to make impactful and meaningful contributions to the workplace (Spreitzer, 1995). As a motivational construct,

psychological empowerment has been found to play a key role in translating formal leadership inputs into critical employee outcomes (Chen, Kirkman, Kanfer, Allen, & Rosen, 2007). In the context of virtual teams, formal leaders can increase their members' sense of empowerment by equipping them with resources necessary for self-regulation (i.e., guiding functions) as well as heightening their intrinsic motivation and sending signals for self-management (i.e., empowering functions). Once sufficiently empowered, team members are likely to step up and assume the leadership role.

This paper aims to make several contributions. First, by exploring important guiding and empowering leadership functions, it helps clarify the understudied role of formal leaders in virtual teams and the ways in which they can be effective. This line of inquiry also contributes to the general leadership literature which has tended to consider the effects of guiding and empowering leadership separately rather than synergistically (e.g., Briker, Hohmann, Walter, Lam, & Zhang, 2021; Lorinkova, Pearsall, & Sims Jr., 2013; Martin, Liao, & Campbell, 2013). Second, by examining a mechanism underlying the link between the formal leadership functions and team members' engagement in leadership, it attempts to shed light on not only the possible coexistence of formal and informal leadership but also the process under which the former cultivates the emergence of the latter. This is particularly important given that research in this area has largely examined these leadership foci as mutually exclusive and there have also been calls to investigate the determinants of informal leadership

in virtual teams (e.g., Hoch & Kozlowski, 2014). The hypothesized model is presented in Figure 1.

Insert Figure 1 about here.

Theoretical Background and Hypotheses

Virtual Teams

Virtual teams are teams whose members are geographically dispersed (i.e., members are spread across multiple locations) and technologically reliant (i.e., members work together through electronic means with limited face-to-face interaction) (Bell & Kozlowski, 2002; Mak & Kozlowski, 2019). The movement toward using virtual teams in the workplace has been facilitated by the widespread practice of organizational decentralization, the globalization of work processes, the rapid advancement of communication technologies, and the increased attention to work-life balance as well as inclusion/diversity issues (Bell & Kozlowski, 2002; Bell et al., 2019; Gibson & Cohen, 2003; Lipnack & Stamps, 2008; Mak & Kozlowski, 2019; Malhotra et al., 2007).

Virtual teamwork arrangements have been suggested to benefit employees considerably by helping them to better navigate their work-life boundaries and thus, to lead a more balanced life (Allen, Golden, & Shockley, 2015; Gajendran & Joshi, 2012). In addition, due to minimal travel requirements and greater autonomy over where and when to work, the virtual workforce has been increasingly joined by otherwise marginalized workers such as older workers, single-parent workers, and

workers with disabilities (Bureau of Labor Statistics, 2020). Virtual teams also bring a number of benefits to organizations. Not only do virtual teams enable organizations to quickly respond to business globalization challenges (Kayworth & Leidner, 2002; Maznevski & Chudoba, 2000; Montoya-Weiss, Massey, & Song, 2001), but they are often a cost-effective means to engage and connect talent located around the globe (Society for Human Resource Management, 2012). Under the best scenario, virtual teams can be a hub of invaluable information, knowledge, and resources from an extensive range of contexts.

That being said, given the physical separation, the possible absence of shared work history, and the limited opportunities for face-to-face communication, virtual teams are not without challenges (Kirkman & Mathieu, 2005; Kirkman et al., 2012; Liao, 2017; Stanko & Gibson, 2009). For example, there is a greater possibility for feedback/response delays, misinterpretations, loss of mutual understanding, and intercultural conflicts in virtual teams than in traditional teams (Blackburn et al., 2003; Gibson & Gibbs, 2006; Hertel, Geister, & Konradt, 2005; Jarvenpaa & Leidner, 1999; Klitmøller & Lauring, 2013; Liao, 2017). Another common challenge faced by virtual teams is a lack of trust among team members (Aubert & Kelsey, 2003; Jarvenpaa & Leidner, 1999). Whereas traditional team members can build trust by actively participating in face-to-face interactions and by frequently engaging in mutual monitoring, virtual team members oftentimes find observing others' progress much more difficult, if not impossible. With a low level of trust among members, virtual team performance may suffer as a result (De Jong, Dirks, & Gillespie, 2016). In

addition to communication and social-emotional issues, virtual teams are prone to logistical ones (e.g., scheduling difficulties), often caused by time differences and technological breakdowns (Bergiel, Bergiel, & Balsmeier, 2008; Olson & Olson, 2000).

The Role of Formal Leadership in Virtual Teams

Being an effective formal leader in a virtual environment is no easy task. Due to limited face-to-face interaction with their teams, formal leaders often find it difficult to monitor team progress and performance, which hinders them from introducing timely interventions (e.g., coaching, mentoring, motivating, and other developmental strategies) necessary for task accomplishments (Avolio, Kahai, & Dodge, 2000; Bell & Kozlowski, 2002; Purvanova & Bono, 2009). Formal leaders also have to cope with a high level of uncertainty and a low level of trust inherent in virtual settings (Duarte & Snyder, 2006; Jarvenpaa & Leidner, 1999; Li, 2007). Indeed, empirical evidence has long suggested that virtual leaders need to invest more resources and effort than traditional leaders to get their teams to operate effectively (Purvanova & Bono, 2009). That being said, trying harder might not always be viable in reality, and under many circumstances, their ability to perform certain functions may be impeded no matter how much effort they put forth.

Several researchers have pointed to self-management as a solution to this dilemma, arguing that part of leadership in virtual teams should be delegated to team members rather than centralized to the formal leader as is traditionally the case (e.g., Bell & Kozlowski, 2002; Hill & Bartol, 2016; Hoch & Kozlowski, 2014). In addition

to reducing the heavy cognitive load formal leaders have to bear, team members' engagement in leadership activities is expected to minimize communication problems caused by hierarchical organizational structures and to increase collective effectiveness given the highly task interdependent nature of most virtual teams (Bell & Kozlowski, 2002).

While it seems clear now that formal leaders of virtual teams should direct their efforts at facilitating members' leadership emergence, much less is known about what they need to do to fulfill this role (Hoch & Kozlowski, 2014). Bell and Kozlowski (2002) and Hill and Bartol (2016) are perhaps among the few studies that attempt to address this question. Adopting a leadership substitute perspective (e.g., Kozlowski, Gully, McHugh, Salas, & Cannon-Bowers, 1996), Bell and Kozlowski (2002) theorize formal leaders need to set up a guiding system from which team members can look for information and cues to regulate their own performance. Such a system should include specific objectives and a clear direction of where the team is heading, as well as rules and routines in regard to frequently encountered stimuli—especially those related to virtual team characteristics. For example, it can be challenging to monitor what others are working on in a virtual environment given that virtual team members are, in many cases, dispersed across time zones. Formal leaders, therefore, should ensure everyone is able to use appropriate technological media for different situations and should set norms for open and transparent communication. Hill and Bartol (2016), on the other hand, emphasize the importance of empowering tactics (i.e., leading by example, participative decision making, coaching, informing, and

showing concern). Particularly, they argue that when formal leaders of virtual teams practice empowering leadership, they can increase individual members' intrinsic motivation to capitalize on the power distributed to them.

Despite their different theoretical groundings, Bell and Kozlowski's (2002) and Hill and Bartol's (2016) contingency models are not necessarily mutually exclusive. They illustrate the possible facets of effective leadership in virtual teams, with the formal leader needing to not only provide sufficient guidance and resources but also create a supportive working environment for team members to step up and manage themselves. Hence, it is reasonable to expect that a combination of both perspectives is likely to lead to a more comprehensive model of virtual team leadership.

Formal Leadership Functions and Individual Leadership Emergence

To specify the behaviors formal virtual leaders might need to perform, I integrate Bell and Kozlowski's (2002) and Hill and Bartol's (2014) theorizing with the functional perspective (e.g., Hackman & Wageman, 2005; McGrath, 1962; Morgeson et al., 2010). According to the functional perspective, formal leadership should be essentially oriented around the satisfaction of important team needs, and as team needs vary depending on social contexts, there might not exist a single generic approach applicable to all situations (Burke et al., 2006; McGrath, 1962). This fundamental premise is particularly relevant for this study given the non-traditional workplace context of virtual teams and the unique team needs that are centered on the leadership emergence of team members.

Guiding Leadership Functions

As posited by Bell and Kozlowski (2002), guiding leadership functions in virtual teams should consist of those aimed at promoting a shared understanding of team tasks and establishing clear work procedures—such as *defining mission* (i.e., determining and communicating the performance expectations for the team), *establishing expectations and goals* (i.e., setting explicit, challenging but achievable goals), and *structuring and planning* (i.e., determining the best steps to achieve those performance goals) (Morgeson et al., 2010). These functions specifically help team members work in synchronicity with one another despite the geographical distance and lack of face-to-face interaction. Smooth collaboration and communication are then likely to increase their perceived confidence in coordinating task activities and leading others. However, in addition to the aforementioned functions, formal leaders may also need to perform *sense-making*, *monitoring,* and *providing feedback* to effectively guide their members due to the isolation and complexity that characterize virtual teamwork.

Sense-making entails the process of identifying and interpreting critical environmental events that might impact team success and relaying them to the team (Morgeson, 2005; Mohrman, Klein, & Finegold, 2003; Weick, 1995; Zaccaro, Rittman, & Marks, 2001). As an important prerequisite to reaching informed decisions in response to proximate events, sense-making can influence team members' perceived efficacy for leadership responsibilities. The role of sense-making might be more salient in a virtual environment for several reasons. Virtual team members are often summoned to solve complex problems (Alsharo, Gregg, & Ramirez, 2017; Kirkman,

Rosen, Tesluk, & Gibson 2004), thus their environment might be constantly changing and/or characterized by significant ambiguity. In addition, virtual teams are likely dynamic participation hubs as many of the members are outside experts who come and go after completing their specific tasks (Bell & Kozlowski, 2002; Townsend, DeMarie, & Hendrickson, 1998). Without proper sense-making, such characteristics may make it challenging for everyone in the team to understand their individual and collective goals, which might consequently reduce their perceived capability to step up as a leader.

Monitoring refers to examining available resources, progress toward task accomplishment, and the external team context (Hackman & Walton, 1986; Komaki, Desselles, & Bowman, 1989; McGrath, 1962; Yukl, 1989). As opposed to traditional leaders who can be physically present with their teams and observe most of the task-relevant behaviors in real-time, virtual leaders often struggle with obtaining the information necessary to evaluate resource availability as well as members' progress and performance through a myriad of different communication media. Because of this and the highly interdependent nature of virtual tasks, team members are better positioned than formal leaders to monitor their own performance in virtual settings (Bell & Kozlowski, 2002; Carte, Chidambaram, & Becker, 2006). Formal leaders, on the other hand, should be responsible for keeping track of the team's overall progress and monitoring its working environment to formulate timely and appropriate work strategies. Similar to sense-making, the monitoring function helps reduce the

uncertainty of the virtual environment, and thus is crucial for the development of team member leadership emergence.

Providing feedback is an integral leadership function, perhaps more so for virtual teams, since they are faced with adaptability challenges and a high potential for process loss (Gilson, Maynard, Young, Vartiainen, & Hakonen, 2015; Peñarroja, Orengo, Zornoza, Sánchez, & Ripoll, 2015; Sivunen, 2006). While motivating team members to frequently provide feedback to one another, formal leaders should also review the team performance against goals and expectations as well as the team's adherence to structures and work rules set up in the first place. Effective feedback, as a result, can improve team members' understanding of their contributions to the collective performance and enable them to develop coordination strategies in a timely manner (Hoch & Kozlowski, 2014). When team members feel more confident in their ability to complete their tasks and work effectively with others, they are likely to be motivated to take on leadership responsibilities.

Empowering Leadership Functions

In addition to guiding functions, formal leaders should attempt to create an empowering environment wherein virtual team members are provided with adequate support and explicit signals for leadership emergence (Hill & Bartol, 2016). To create such an environment, formal leaders may need to engage in *managing team boundaries*, *providing resources*, *encouraging team self-management*, and *supporting social climate*.

Managing team boundaries entails managing the relationship of the team with other organizational constituents and integrating the team's work into the larger context of the organization (Ancona, 1990; Ancona & Caldwell, 1992; Druskat & Wheeler, 2003; Sundstrom, De Meuse, & Futrell, 1990). This function might be particularly important for virtual team members because they already have difficulties connecting with each other (Liao, 2017), let alone the rest of the organization. By addressing this, formal leaders can improve members' perception of their own effectiveness (e.g., Burke et al., 2006) and help them receive additional resources from the outside (e.g., Kolodny, & Kiggundu, 1980), which can be essential ingredients for their successful emergence as informal leaders.

Providing resources involves acquiring and distributing personnel, financial, informational, and physical resources for the team to perform its task. *Encouraging team self-management*, on the other hand, refers to the process of the formal leader stepping back and sharing leadership responsibilities with the team (Morgeson et al., 2010). Both functions serve to send signals of leaders' support and confidence in the team members' efficacy to complete their work successfully (Morgeson et al., 2010; Shea & Guzzo, 1987). Providing resources and encouraging team self-management is particularly important for the development of leadership in virtual teams. Due to limited interaction with the larger organizational context and the physical distance from their peers (Lipnack & Stamps, 2000; Townsend et al., 1998), team members may experience a reduced level of motivation that normally comes from colocation and frequent face-to-face contact (Kayworth & Leidner, 2001; Kirkman et al., 2004).

Further, process losses inherent in computer-mediated communication might cause members to be unwilling to trust each other and to take initiative. For such reasons, formal leaders can motivate members to engage in leadership by being explicit with their intent of delegating leadership responsibilities and by providing members with sufficient resources to do their work.

Supporting social climate means demonstrating a general concern for the team's well-being and addressing interpersonal issues impeding team progress toward task accomplishment (Fleishman et al., 1991; Hackman & Walton, 1986). This function fosters team trust and commitment—which are critical elements for team members to accept and exercise influence on one another (Bligh, Pearce, & Kohles, 2006). Due to the lack of social connection among members and the prevalence of misunderstandings inherent in virtual teams (Liao, 2017), formal leaders may need to invest more effort in performing this function than those leading traditional face-to-face teams.

Hypothesis 1: *A combination of guiding (i.e., defining missions, establishing expectations and goals, structuring and planning, sense-making, monitoring, and providing feedback) and* e*mpowering functions (i.e., managing team boundaries, providing team resources, encouraging team self-management, and supporting social climate) is positively related to individual leadership emergence in virtual teams.*

The Mediating Role of Psychological Empowerment

Even though the guiding and empowering leadership functions discussed above are aimed at promoting team members' leadership emergence, their influence might

not be immediate but through psychological empowerment. Psychological empowerment is a motivational construct encompassing four distinct dimensions—namely impact, potency, meaningfulness, and autonomy (Chen et al., 2007; Kirkman & Rosen, 1997, 1999; Seibert, Wang, & Courtright, 2011; Spreitzer, 1995). *Impact* represents a person's belief that he or she can influence managerial processes and make a change to collective outcomes (Abramson, Seligman, & Teasdale, 1978; Ashforth, 1989). *Potency* refers to one's evaluation of his or her own competence to successfully achieve task objectives (Bandura, 1989). *Meaningfulness* is the extent to which a person's work roles align with his or her personal values and beliefs (Hackman & Oldham, 1980). Finally, *autonomy* is one's sense of freedom and control regarding the initiation, continuance, and regulation of his or her work activities (Deci, Connell, & Ryan, 1989). Empowered individuals, therefore, are those who believe they have the capability and autonomy to make meaningful and impactful contributions to their organization.

Psychological empowerment is an important manifestation of employee motivation in the workplace (Seibert et al., 2011). It has been found to be associated with a broad range of desirable outcomes such as job satisfaction (Kraimer, Seibert, & Liden, 1999; Liden, Wayne, & Sparrowe, 2000), organizational commitment (Meyer, Becker, & Vandenberghe, 2004; Spreitzer, 1995), and task performance (Bandura & Locke, 2003; Stajkovic & Luthans, 1998). It can be determined by both contextual (e.g., managerial practices, leadership, and work-design characteristics) and personal (e.g., human capital, personality traits, and gender) factors. Among these, formal

leadership has been identified to have one of the strongest impacts (*mean corrected correlation* = .53) (Seibert et al., 2011).

Given its close associations with formal leadership and many employee outcomes, psychological empowerment has been studied as a mediator between these sets of variables. For example, Chen et al., (2007) find that leader-member exchange is related to individual performance through psychological empowerment. Avolio, Zhu, Koh, and Bhatia (2004), in a similar vein, report a mediating effect of psychological empowerment on the link between transformational leadership and organizational commitment. Building on this line of research, it is viable to expect that psychological empowerment can also help explain how the formal leadership functions facilitate team members' engagement in leadership behaviors.

The guiding leadership functions might improve members' psychological empowerment through building their commitment to the team's objectives and reducing the uncertainty of the virtual environment. Specifically, by developing a shared understanding of team tasks and establishing clear work procedures (i.e., *defining missions, establishing expectations and goals, structuring and planning*), formal leaders help facilitate coordination among physically separated members and allow them to see the value of their work, thus promoting the sense of potency and meaningfulness. *Monitoring* and *sense-making* might also be important sources of potency since they enable formal leaders to introduce timely interventions and maximize team members' chances of success. Finally, by *providing feedback*, formal leaders foster team members' awareness of their potential and allow them to identify

appropriate answers to work-related challenges. Team members' feelings of potency and impact, as a result, are likely to increase.

The empowering functions might influence team members' psychological empowerment through providing work resources, support, and sending signals for self-management. For example, when formal leaders help *manage team boundaries*, members are likely to feel more competent since they can focus on completing their tasks without many disturbances while still being able to maintain relationships with those outside of the team. In addition, by *providing team resources* and *encouraging team self-management*, formal leaders explicitly express their confidence in team members' potency and prospects for high performance. These functions might also make team members aware of their autonomy and learn how to exert an impact on collective outcomes (Manz & Sims, 1987; Zhang & Bartol, 2010). Lastly, by *supporting social climate*, formal leaders facilitate knowledge exchange and coordination activities among team members, thus enhancing their sense of potency.

Psychological empowerment, in return, is likely to prompt team members to become leaders. Particularly, meaningful work is likely to foster a sense of involvement, commitment, and identification (Spreitzer, 2008), which then encourages team members to perform what is considered beneficial to their team and organization such as engagement in leadership behaviors. Autonomy, impact, and potency can further facilitate leadership emergence since team members are provided with control over how they want to do their work and might feel capable of taking charge and leading others if they try (Bandura, 1989). Supporting this line of argument, research

has suggested that psychologically empowered individuals are likely to predict problems, act independently in the face of obstacles, and demonstrate proactivity and resourcefulness (Spreitzer, 1995, 2008), which are oftentimes discussed as manifestations of leadership or connected to the concept of leadership (Yukl, 1989, 2012).

Drawing on the discussion above, it is reasonable to argue that psychological empowerment is a mechanism underlying the relationship between the formal leadership functions and team members' leadership emergence. Therefore, I hypothesize:

Hypothesis 2: *Psychological empowerment mediates the relationship between the leadership functions and individual leadership emergence in virtual teams.*

Overview of Studies

I designed two studies to validate the research model. In Study 1, I used an online panel sample to examine the factor structure of the leadership functions. In Study 2, I tested the hypotheses by recruiting professional master's students to participate in a scenario experiment.

Study 1: Factor Structure Analysis

Sample and Procedure

Three hundred forty participants were recruited from an online panel through Prolific. Forty participants failed an attention check[1], leaving 300 for analysis. All

[1] An attention check which asked participants to tick "Strongly Disagree" was inserted into the survey flow (i.e., It's important that you pay attention to this study. Please tick "Strongly Disagree"). Participants who failed to do so were excluded from the analysis.

participants were members of virtual teams at the time of the survey with 31% of participants having worked remotely before COVID-19 while others were working on virtual teams due to the pandemic. Thirty percent of the participants were female. The average age was 30.97 (*SD* = 8.88) with an average of 12.09 months (*SD* = 14.33) of team tenure and 13.73 months (*SD* = 20.14) of virtual work experience. Participants were asked to evaluate their current virtual team leader's behaviors and instructed to focus on the leader of the team in which they devoted the most time if they were working in multiple virtual teams.

Formal Leadership Functions

I adopted Morgeson et al. (2010)'s functional leadership scale (see Appendix A for full items) to assess the leadership functions of interest. In general, all the functions demonstrated good internal consistency (Cronbach's alpha) ranging from .77 to .93 (see Table 1).

I also used the scale to assess five other functions (i.e., compose team, train and develop team, challenge team, solve problems, and perform team task) that are mentioned in Morgeson et al. (2010)'s work but not used in this paper (see Appendix A for full items). The main purpose of this step was to test the validity of the additional functions before using them in other studies to examine whether they are, as proposed, less critical for virtual teams than the 10 functions of interest. Overall, the additional functions showed good internal consistency (Cronbach's alpha), ranging from .85 to .95 (see Table 1).

Insert Table 1 about here.

Confirmatory Factor Analysis

The means, standard deviations, and correlations among the leadership functions are presented in Table 1. First, I conducted a confirmatory factor analysis (CFA) to test whether the hypothesized two-factor virtual functional leadership model (i.e., the ten first-order functions map to two second-order guiding and empowering factors) fit the data better than alternative models. I used MLR estimation (Satorra & Bentler, 1994) to determine the models' goodness of fit since it is more robust to violations of multivariate normality (Kline, 2016). I adopted the commonly accepted cut-off values (Comparative Fit Indices (CFI) > .90, Root Mean Square Residual (RMSEA) < .08, Standardized Root Mean Square Residual (SRMR) < .08) as indicative of good fit (Dulac, Coyle-Shapiro, Henderson, & Wayne, 2008; Hair, Anderson, Tatham, & Black, 1998; Kline, 2016). I then calculated the Satorra-Bentler scaled chi-square difference test (Satorra & Bentler, 1994) to determine the best fitting model. The fit indices and results of the test are presented in Table 2.

According to the approximate fit indices, the hypothesized two-factor model (i.e., Model 2) fit better than the single-factor model (i.e., Model 1) (Δ scaled chi-square = 51.86, Δ df = 1, p<.001). Model 2, however, failed the chi-square test with a significant p-value (p <.001), suggesting that post-hoc modifications be needed to improve the overall fit. Based on the modification indices, I added error correlations among *defining mission, establishing expectations and goals*, and *structuring and*

planning and allowed *establishing expectations and goals* to also load on the empowering factor. The former respecification is theoretically plausible since those functions are hypothesized to measure guiding leadership. The latter respecification can be justified by the fact that empowering and guiding factors were highly correlated (r=.90). As shown in Table 2, Model 3 (i.e., the two-factor model with modifications) passed the chi-square test (p = .08) and fit the data better than Model 2 (Δ scaled chi-square = 60.30, Δ df = 4, p<.001).

A higher-order model subsuming empowering and guiding factors was under-identified (Kenny, Kashy, & Bolger, 1998), and thus is not included in Table 2.

Insert Table 2 about here.

Study 1 Discussion

I conducted a CFA analysis on a sample of 300 Prolific participants to examine the factor structure of the virtual leadership functions. The results suggested that the functions are comprised of two distinct factors, with the guiding factor measured by *defining mission, establishing expectations and goals, structuring and planning, sense-making, monitoring, and providing feedback*, and the empowering factor measured by *establishing expectations and goals, managing team boundaries, providing team resources, encouraging team self-management, and supporting social climate*. It is important, however, to note that even though *establishing expectations and goals* was allowed to load on both factors in the retained model (i.e., Model 3), previous research has tended to identify it as a guiding function (e.g., Bell & Kozlowski, 2002).

Therefore, I proceeded to Study 2 using the hypothesized categorization of the leadership functions. I further validated this decision on the pilot data in Study 2 by comparing the reliabilities of empowering leadership when it was measured by *establishing expectations and goals* and when it was not. Results are presented in the 'pilot study' section below.

Study 2: A Scenario Experiment

The main purpose of Study 2 was to test the two hypotheses. To do this, I employed a scenario experimental design by asking participants how they would react to hypothetical workplace scenarios. This methodology has been considered a useful way to simultaneously examine internal and external validity since it allows researchers to manipulate independent variables with the use of carefully constructed and realistic scenarios (Aguinis & Bradley, 2014).

Development of Scenarios

I reviewed the extant literature, newspapers, and practitioner guidebooks on virtual leadership as well as conducted multiple interviews with current virtual team leaders/members to capture their experiences of working in virtual teams. For example, I asked the leaders for detailed information about the challenges they encountered and how they tried to resolve them. If there were other challenges identified in the literature but not mentioned by the leaders, I also asked the leaders what they would have done if their teams had faced those challenges. When interviewing the team members, I asked them how their teams planned and coordinated work activities, what the major challenges were, what their leaders did in

response, and how effective the responses were. I then categorized the leader behaviors according to Morgeson et al.'s (2010) taxonomy and developed scenarios reflecting the different leadership dimensions.

The study employed a 2 guiding (high vs. low) x 2 empowering (high vs. low) fully crossed, within-subjects design, which resulted in four scenarios in total. The within-subjects design allows researchers to infer the relative importance of certain factors to a person's decision-making while controlling for the effects of individual differences (e.g., Gregoire & & Shepherd, 2012; Judge & Bretz, 1992). Such an approach is referred to as policy capturing and has been adopted to study various decision-making processes in organizations (e.g., judgment on task importance, Sanchez & Levine, 1989; disciplinary decisions, Klaas & Wheeler, 1990; job choice decisions, Feldman & Arnold, 1978; Rynes & Lawler, 1983).

In the high guiding leadership scenarios, the leader works to clarify each team member's roles and responsibilities while establishing structures for virtual communication and coordination. He also organizes regular team meetings such as standups and retrospectives to check in and to allow the members to share concerns or receive feedback. The leader in the low guiding leadership scenarios, on the other hand, rarely gets involved in structuring his team's work for the virtual environment. Each member tends to have their own methods of communicating and coordinating with others. In the high empowering leadership scenarios, the leader pays attention to the team members' working conditions and invests efforts in building camaraderie not only among them but also with those outside of the team. He also creates opportunities

for the members to voice their opinions and take charge. Meanwhile, the leader in the low empowering leadership scenarios is rather detached from the team's social events if there are any. In addition, he does not explicitly encourage the members to participate in the decision-making process and his decisions are usually final.

To validate the scenarios, I met individually with 15 professional master's students at a large U.S university—all of whom had virtual teamwork experience of at least three months. Specifically, I asked the participants to assess the realism of each scenario on a scale from 1 to 5. If the response was other than "5" (i.e., very realistic), I then asked them to elaborate on the unrealistic details and made revisions accordingly after the interview. The majority of the participants shared similar views on the realism of the scenarios and no further issues were raised after the ninth interview.

The final version of the scenarios is available in Appendix B.

Pilot Study

Prior to the main experiment, I conducted a pilot study to evaluate the manipulations of the scenarios. The sample included 40 participants recruited through Prolific (M_{age} = 33.55, SD_{age} = 9.25, 42.50% female).

Participants were instructed to imagine they were members of a virtual team and were provided with some general information about the team—including the total number of members, their respective locations, and the interdependent nature of the team task. Then, participants were asked to complete three multiple-choice attention check questions to ensure that they remembered the key characteristics of the team

before proceeding to the scenarios (see Appendix C for the questions). Those who gave a wrong answer to any of the attention check questions were excluded from the analysis. The scenarios were presented in random order to minimize order effects. Following each scenario, participants completed the manipulation checks which asked them to evaluate the leadership performed in each scenario. The manipulation checks consisted of highest-loading items found in Study 1 and captured the leadership functions underlying each dimension (guiding: 6 items; empowering: 4 items) (see Appendix C for full items).

As predicted, repeated-measures ANOVAs with a Greenhouse-Geisser correction showed that guiding and empowering leadership significantly differed across scenarios ($F_{guiding}(2.52, 98.15) = 36.99$, $p_{guiding} < .001$; $F_{empowering}(1.89, 73.61) = 93.10$, $p_{empowering} < .001$), with guiding leadership being rated higher in the high guiding scenarios and empowering leadership being rated higher in the high empowering scenarios (see Table 3).

Insert Table 3 about here.

In addition to checking the manipulations, the pilot study was utilized to evaluate whether the *establishing expectations and goals* function can be specified to measure only guiding leadership as discussed in Study 1. To do this, I computed and compared reliability values of the empowering leadership scale with (Cronbach's alpha = .72) and without (Cronbach's alpha = .73) the function being included. The

reliability values were only slightly different, suggesting that it is possible to keep the hypothesized categorization of the leadership functions.

Main Experiment

One hundred eighteen professional master's students at a large private U.S. university were recruited to participate in the main experiment. Fourteen failed at least one attention check, leaving 103 for analysis (M_{age} = 26.42, SD_{age} = 3.68, 66.02% female).

Adopting a similar protocol to the pilot study's, participants were instructed to read the team's general information and to complete three follow-up questions about its main characteristics before evaluating the leadership performed in each scenario (i.e., the manipulation checks). The scenarios were again presented in random order to minimize order effects. After completing the manipulation checks, participants responded to questions regarding psychological empowerment and leadership emergence.

Measures

Unless otherwise noted, all measures used a 7-point Likert-type scale (1 = strongly disagree, 7 = strongly agree).

Manipulation checks

Similar to the pilot study's results, the main experiment data showed that guiding and empowering leadership are significantly different across the four scenarios ($F_{\text{guiding}}(2.55, 260.26) = 108.83$, $p_{\text{guiding}} < .001$; $F_{\text{empowering}}(1.91, 194.44) = 192.91$, $p_{\text{empowering}} < .001$). Post hoc tests using a Bonferroni correction revealed further

support for the manipulations (see Table 3). That is, guiding leadership was significantly stronger in the high guiding scenarios, and empowering leadership was significantly stronger in the high empowering scenarios.

Psychological empowerment

Using the 12-item scale from Spreitzer (1995), participants were asked to respond how they would feel if they were a member of the team in each scenario. The items captured four dimensions of empowerment, including meaning (e.g., "The work I do is very important to me"), competence (e.g., "I am confident about my ability to do my job"), self-determination (e.g., "I have significant autonomy in determining how I do my job"), and impact (e.g., "I have significant influence over what happens in my team") (see Appendix C for full items).

Individual leadership emergence

To assess leadership emergence, participants responded to a 5-item scale modified from Hiller, Day, and Vance (2006) with the following instruction: "How strongly do you agree with the statements below regarding what you would do if you were a member of the team in this scenario?". The scale included the highest-loading items, which captured four core team activities (i.e., planning and organizing, problem solving, support and consideration, development and mentoring) (Hiller et al., 2006), and a global item (i.e., "I share with others in taking on leadership responsibilities") which was developed for this study (see Appendix C for full items).

Results

To evaluate the joint effects of guiding and empowering leadership functions on leadership emergence (Hypothesis 1), I ran a repeated-measures ANOVA with a Greenhouse-Geisser correction. The results revealed that participants' intention to lead significantly varied across scenarios ($F(2.31, 235.85) = 68.45$, $p < .001$). As shown in Table 4, participants were most willing to assume leadership responsibilities in the high guiding-high empowering condition ($M = 5.86$, $SD = .09$) and least likely to do so in the low guiding-low empowering condition ($M = 3.63$, $SD = 1.17$). The post hoc tests also showed a significant difference between the remaining conditions. That is, the low guiding-high empowering condition ($M = 5.03$, $SD = .11$) prompted a higher level of leadership emergence than the high guiding-low empowering condition ($M = 4.41$, $SD = .13$). These results indicated that even though either guiding or empowering leadership functions could motivate people to engage in leadership behaviors, a combination of both was the most effective. Thus, Hypothesis 1 was supported.

Insert Table 4 about here.

In examining Hypothesis 2 which argues for the mediating role of psychological empowerment, I followed Montoya and Hayes' (2017) recommendation to estimate a single indirect effect. Their path-analytic framework, however, is developed specifically for two-condition experiments, which requires it to be modified to fit the four-condition design of the current study. In doing so, I first utilized the manipulation checks' data as the measure of formal leadership functions. Second, given the multilevel nature of the experimental design (i.e., the relationships of interest

nested within individuals), I followed Preacher, Zyphur, and Zhang (2010)'s procedures to estimate the within-level indirect effect. As predicted, there was a positive indirect effect of leadership functions on leadership emergence via psychological empowerment (*Estimate* = .03, 95% 10,000-time Monte Carlo CI = [.007, 063]). Thus, Hypothesis 2 was supported.

As a robustness check, I utilized Montoya and Hayes's (2017) methods to examine the indirect effects for every two scenarios. The results also supported Hypothesis 2. Specifically, the indirect effects were significant when the low guiding-low empowering scenario was compared with the high guiding-high empowering scenario (*Estimate* = 1.59, 95% 10,000-time bootstrapping CI = [1.16, 2.04]), the low guiding-high empowering scenario (*Estimate* = .71, 95% 10,000-time bootstrapping CI = [.40, 1.11]), and the high guiding-low empowering scenario (*Estimate* = .10, 95% 10,000-time bootstrapping CI = [.08, .51]). There were also significant indirect effects when comparing the low guiding-high empowering (*Estimate* = .34, 95% 10,000-time bootstrapping CI = [.16, .53]) and high guiding-low empowering (*Estimate* = .56, 95% 10,000-time bootstrapping CI = [.31, 1.63]) scenarios with the high guiding-high empowering one.

Study 2 Discussion

In Study 2, I designed a scenario experiment to examine (1) the joint effects of the guiding and empowering leadership functions on participants' leadership emergence, and (2) the mediating role of psychological empowerment. All the hypotheses were supported. Participants expressed a higher intention to lead in the

high guiding-high empowering scenario than in other scenarios. Further, not only guiding but also empowering leadership was revealed to play an important role in prompting team members to engage in leadership activities.

Interestingly, participants' ratings on leadership emergence were significantly higher in the low guiding-high empowering condition than in the high guiding-low empowering condition. There can be at least two explanations for this phenomenon. First, it is possible that the layout of the scenarios affected the participants' responses. As the guiding leadership section was presented before the empowering leadership section in every scenario, the information on empowering leadership might have had a stronger impact on participants' overall evaluation of the scenario leader than the information on guiding leadership. A tendency to recall the last items in a list has been widely examined in the literature and referred to as 'the recency effect' (Atkinson & Shiffrin, 1968). Recency effects are likely to occur when the scenarios are relatively long and when there is little delay between the scenario presentation and the survey questions (Bjork & Whitten, 1974; Atkinson & Shiffrin, 1968), which are consistent with this study's design.

The different results for the low guiding-high empowering and high guiding-low empowering scenarios, however, can also be explained from a theoretical standpoint. For example, the effects of guiding leadership have been found to diminish over time whereas the effects of empowering leadership tend to follow an opposite pattern (Lorinkova et al., 2013). Since the writing of the scenarios might have created an impression that the team was not newly established (e.g., "annual performance

evaluation meetings"), participants might have perceived empowering leadership to be more critical for leadership emergence than guiding leadership.

General Discussion

The paper's overarching goal is to provide insight into the role of formal leadership in virtual teams and the specific functions they might need to perform to be effective. Contingency models developed by previous research (Bell & Kozlowski, 2002; Hill & Bartol, 2016) suggest that formal leaders need to focus on delegating part of their responsibilities to team members given the challenges of coordinating and monitoring task activities in the virtual environment. Integrating these theoretical perspectives with the functional leadership framework (Hackman & Wageman, 2005; Lord, 1977; McGrath, 1962; Morgeson, 2005; Morgeson et al., 2010), I identified ten leadership functions that are critical to guiding and motivating team members to take charge. I also examined psychological empowerment as an important mechanism underlying the effects of the functions on the leadership emergence of team members. The findings in Study 1 suggest that the leadership functions are, as hypothesized, comprised of guiding and empowering dimensions. The guiding functions are aimed at alleviating the ambiguity and uncertainty characterizing the virtual environment. The empowering functions, on the other hand, are centered around providing resources and sending explicit self-management signals to team members. In Study 2, I examined (1) the direct effects of the leadership functions on leadership emergence and (2) the mediating role of psychological empowerment in a scenario experiment. The results support the hypotheses. That is, participants expressed the highest level of intention to

lead when the scenario leader performed both guiding and empowering functions and the relationship between the leadership functions and leadership emergence was mediated by participants' sense of empowerment.

Theoretical Contributions

First, by drawing on team-centric leadership frameworks to explicate the role of formal team leaders in the virtual environment and identifying the specific functions they might need to perform, this paper extends the existing literature which has largely relied on dyadic leader-member leadership theories. As many scholars in this area have highlighted, what works for dyads does not always work for teams and applying dyadic knowledge to teams might cause us to overlook the various ways in which team leaders can impact individual and collective outcomes (Bell et al., 2019; Kirkman et al., 2012).

Second, by finding support for the integration of Bell & Kozlowski's (2002) and Hill & Bartol's (2016) theoretical perspectives, this paper contributes to the limited empirical research that has examined research models developed particularly for the unique context of virtual teams. It also furthers the general leadership literature by demonstrating that guiding and empowering leadership are not mutually exclusive and that their joint effects under some circumstances can be stronger than their individual ones.

Third, the paper finds a link between formal leadership functions and the leadership emergence of team members, which sheds light on the possible coexistence of multiple leadership foci in the virtual environment. Even though the notion that

leadership does not exclusively originate from formal leaders has been acknowledged by organizational scholars in traditional work settings (e.g., Chiu, Owens, & Tesluk, 2016; Morgeson et al., 2010; van Knippenberg & Dwertmann, 2022), the virtual team leadership literature to date has tended to center on a single leadership source or to suggest one source is more important than the other. Such an approach might result in an underestimation of the total leadership capacity in a team (Morgeson et al., 2010) and of the formal leaders' critical role in leading their virtual team members to lead.

Finally, by finding support for the mediating role of empowerment, this paper contributes insight into how formal leadership functions impact not only team members' behavioral processes but also psychological ones. This line of inquiry also responds to calls for investigating the predictors of informal leadership given its salient impacts on virtual team functioning (e.g., Hoch & Kozlowski, 2014).

Limitations and Future Directions

Several limitations in the present paper should be highlighted. First, the hypotheses were only tested in a scenario experiment which can raise concerns about the external validity of the findings. Even though I took several measures to address this issue (i.e., referencing multiple resources in writing the scenarios and validating them through one-on-one interviews with professional master's students), the scenarios might not be able to offer the same level of realism and immersion as participants would encounter in real life (Lohrke, Holloway, & Woolley, 2010). Future research, therefore, is encouraged to replicate the research model using other data

collection methods, such as field experiments or time-lagged surveys, that can result in higher levels of confidence regarding both internal and external validity.

Second, despite its focus on virtual team leadership, the research model is specified at the individual level, leaving questions regarding the effects of the leadership functions on team processes and outcomes unexplored. Thus, a fruitful avenue for future research is to investigate how the leadership functions impact key team processes, especially those that are specific to the virtual environment, and whether they can lead to better team performance as assumed in this paper. For example, in light of Study 2's findings, it is possible to expect that the leadership functions can facilitate the development of shared leadership which has been found to be a critical predictor of virtual team effectiveness (Hoch & Kozlowski, 2014).

Third, another limitation is that the paper does not examine any contextual factors that might strengthen or reduce the effects of the leadership functions. An example of such a factor is virtuality. Virtuality refers to the extent to which team members are geographically dispersed and reliant on technological communication (Bell & Kozlowski, 2002). A high (versus low) level of virtuality might lead to more (versus fewer) coordination and knowledge sharing challenges (Bell & Kozlowski, 2002; Hill & Bartol, 2016; Hoch & Kozlowski, 2014), thereby rendering the leadership functions more (versus less) relevant to performance. While planning for data collection, future research is also encouraged to examine different levels of virtuality—ranging from completely in-person, to hybrid, to completely virtual—so as to effectively capture the changing effects of the leadership functions if there are any.

Finally, the paper does not examine all the leadership functions discussed in the literature (e.g., Morgeson et al., 2010), assuming that some functions are more critical for virtual team effectiveness than others. While this approach has been adopted elsewhere (e.g., Bell & Kozlowski, 2002; Corderoy & Soo, 2008; Malhotra et al., 2007), future research is encouraged to validate such an assumption by also incorporating the seemingly less important functions in their analysis.

Practical Implications

Notably, the findings show that formal leadership has considerable influence on virtual team members' psychological (e.g., psychological empowerment) and behavioral (e.g., leadership engagement) outcomes—those that are likely to be critical for their overall functioning (e.g., Bell & Kozlowski, 2002; Kirkman, Rosen, Tesluk, & Gibson, 2004; Hill & Bartol, 2016; Hoch & Kozlowski, 2014). Without effective formal leadership, members might lack confidence in their ability to make meaningful and impactful contributions to the organization since they are physically separated from their peers and perhaps also from the rest of the organization. Formal leaders, therefore, should be provided with adequate support and orientation to successfully perform their role.

From a human resource management standpoint, the research provides suggestions for staffing and training for developing effective virtual team leaders. First, it shows that those who can perform both guiding and empowering leadership functions are preferable to lead virtual teams, suggesting that organizations assess the level of leadership capacity of current leaders in order to provide timely training or

focus on such characteristics when hiring new leaders. Second, it specifies six guiding and four empowering functions that should be considered when designing training programs for virtual team leaders. Even though these functions do not necessarily cover all aspects of formal leadership responsibilities, they can be utilized as a basic framework on which organizations build further to better fit their respective working environments.

Conclusion

The present paper was designed to offer theoretical insight regarding the role of formal leaders in virtual teams and the various behaviors they might need to perform. By integrating two contingency models of virtual team leadership with the functional leadership theory, the paper finds that formal leaders who engage in both guiding and empowering functions can help team members feel more empowered and more motivated to take charge. In addition to its theoretical implications, the research might be used to assist organizations in planning and developing training programs that are well-suited for virtual teamwork arrangements.

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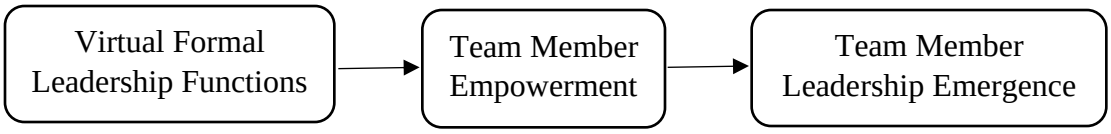
Figure 1

Hypothesized Model



Guiding Functions

- Defining mission
- Establishing expectations & goals
- Structuring & planning
- Sense-making
- Monitoring
- Providing feedback

Empowering Functions

- Managing team boundaries
- Providing team resources
- Encouraging team self-management
- Supporting social climate

Table 1

Descriptive Statistics and Correlations (Study 1)

	Function	***M***	***SD***	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1.	DEF	5.32	1.16	(.91)														
2.	EST	5.23	1.04	.83	(.93)													
3.	STR	5.08	1.11	.80	.82	(.88)												
4.	SEN	4.92	1.12	.70	.74	.72	(.89)											
5.	MON	5.04	1.02	.69	.72	.74	.73	(.77)										
6.	FEED	5.08	1.11	.68	.76	.72	.69	.74	(.83)									
7.	RES	5.16	1.09	.69	.69	.70	.66	.70	.70	(.87)								
8.	BOUN	5.00	1.15	.62	.60	.66	.69	.69	.65	.71	(.83)							
9.	SELF	5.29	1.04	.46	.46	.46	.46	.50	.50	.51	.47	(.86)						
10.	CLI	5.01	1.30	.68	.61	.65	.69	.63	.68	.70	.74	.55	(.90)					
11.	COM	5.00	1.15	.59	.52	.57	.55	.57	.61	.63	.56	.47	.59	(.85)				
12.	TRAIN	5.05	1.18	.73	.68	.72	.68	.69	.72	.72	.66	.49	.75	.73	(.88)			

13. CHA	4.76	1.16	.61	.60	.64	.64	.66	.65	.68	.66	.48	.69	.63	.72	(.86)		
14. PER	4.90	1.50	.48	.40	.53	.50	.55	.52	.61	.57	.45	.68	.53	.67	.59	(.95)	
15. SOL	5.12	1.24	.66	.61	.64	.63	.64	.66	.76	.68	.53	.74	.63	.74	.77	.75	(.92)

Note. N = 300. Internal consistency estimates (Cronbach's alphas) are presented in parentheses on the diagonal. All correlations significant at $p<.001$, two-tailed. DEF = define mission. EST = establish expectations and goals. STR = structure and plan. SEN = sensemaking. MON = monitor team. FEED = provide feedback. RES = provide resources. BOUN = manage team boundaries. SELF = encourage team self-management. CLI = support social climate. COM = compose team. TRAIN = train and develop team. CHA = challenge team. PER = perform team task. SOL = solve problems.

Table 2

Values of Selected Fit Statistics for the One-factor, Two-factor, and Modified Two-factor Models (Study 1)

Statistic	**Model 1 One Factor**	**Model 2 Two Factors**	**Model 3 Two Factors (modified)**
Scaled χ^2	148.029	96.17	41.46
df	35	34	30
p	<.001	<.001	.08
Scaling Correction Factor	1.44	1.47	1.49
RMSEA [90% CI]	.10 [.09, .12]	.08 [.06, .10]	.04 [.01, .06]
CFI	.93	.96	.99
TLI	.91	.95	.99
SRMR	.04	.03	.02
	Scaled χ^2 Difference Test		
	Model 1 vs. Model 2	Model 2 vs. Model 3	
Scaled χ^2 difference	51.86	60.30	
Scaling Correction	1.47	1.32	
df difference	2	4	
p	<.001	<.001	

Note. The goodness of fit of the model is tested using a robust maximum likelihood estimate (Satorra & Bentler, 1994).

Table 3

Results of Manipulation Checks (Study 2)

	Guiding				**Empowering**			
	Pilot		**Experiment**		**Pilot**		**Experiment**	
	M	***SD***	***M***	***SD***	***M***	***SD***	***M***	***SD***
Scenario 1	5.65	.15	5.83	.89	5.82	.12	5.88	.88
Scenario 2	3.45	.21	4.44	1.18	5.16	.15	5.43	1.08
Scenario 3	4.44	.21	4.88	1.08	3.13	.19	3.43	1.18
Scenario 4	3.13	.23	3.19	1.45	2.93	.21	3.01	1.19

Note. $N_{\text{Pilot}} = 40$. $N_{\text{Experiment}} = 103$. Scenario 1 = high guiding-high empowering. Scenario 2 = low guiding-high empowering. Scenario 3 = high guiding-low empowering. Scenario 4 = low guiding-low empowering.

In analyzing pairwise comparisons among the scenarios, a Bonferroni adjustment was used to control the overall type I error rate. In the pilot study, all mean differences were significant except for the mean difference in guiding leadership between Scenarios 2 and 4, and the mean difference in empowering leadership between Scenarios 3 and 4. In the main study, all mean differences were significant.

Table 4

Means and Standard Deviations of Empowerment and Intention to Lead (Study 2)

	Empowerment		**Intention to Lead**	
	M	***SD***	***M***	***SD***
Scenario 1	5.53	.08	5.86	.09
Scenario 2	5.02	.09	5.03	.11
Scenario 3	4.13	.10	4.41	.13
Scenario 4	3.66	.12	3.63	.17

Note. $N = 103$. Scenario 1 = high guiding-high empowering. Scenario 2 = low guiding-high empowering. Scenario 3 = high guiding-low empowering. Scenario 4 = low guiding-low empowering.

In analyzing pairwise comparisons among the scenarios, a Bonferroni adjustment was used to control the overall type I error rate. All mean differences were significant.

APPENDIX A

Leadership Functions (Morgeson et al., 2010)

Define mission

1. Ensures the team has a clear direction
2. Emphasizes how important it is to have a collective sense of mission
3. Develops and articulates a clear team mission
4. Ensures that the team has a clear understanding of its purpose
5. Helps provide a clear vision of where the team is going

Establish expectations and goals

1. Defines and emphasizes team expectations
2. Asks team members to follow standard rules and regulations
3. Communicates what is expected of the team
4. Communicates expectations for high team performance
5. Maintains clear standards of performance
6. Sets or helps set challenging and realistic goals
7. Establishes or helps establish goals for the team's work
8. Ensures that the team has clear performance goals
9. Works with the team and individuals in the team to develop performance goals
10. Reviews team goals for realism, challenge, and business necessity

Structure and plan

1. Defines and structures own work and the work of the team

2. Identifies when key aspects of the work need to be completed
3. Works with the team to develop the best possible approach to its work
4. Develops or helps develop standard operating procedures and standardized processes
5. Clarifies task performance strategies
6. Makes sure team members have clear roles

Sensemaking

1. Assists the team in interpreting things that happen inside the team
2. Assists the team in interpreting things that happen outside the team
3. Facilitates the team's understanding of events or situations
4. Helps the team interpret internal or external events
5. Helps the team make sense of ambiguous situations

Monitor

1. Monitors changes in the team's external environmental
2. Monitors team and team member performance
3. Keeps informed about what other teams are doing
4. Requests task-relevant information from team members
5. Notices flaws in task procedures or team outputs

Provide feedback

1. Rewards the performance of team members according to performance standards
2. Reviews relevant performance results with the team

3. Communicates business issues, operating results, and team performance results
4. Provides positive feedback when the team performs well
5. Provides corrective feedback

Provide resources

1. Obtains and allocates resources (materials, equipment, people, and services) for the team
2. Seeks information and resources to facilitate the team's initiatives
3. Sees to it that the team gets what is needed from other teams
4. Makes sure that the equipment and supplies the team needs are available
5. Helps the team find and obtain "expert" resources

Manage team boundaries

1. Buffers the team from the influence of external forces or events
2. Helps different teams, communicate with one another
3. Acts as a representative of the team with other parts of the organization (e.g., other teams, management)
4. Advocates on behalf of the team to others in the organization
5. Helps to resolve difficulties between different teams

Encourage team self-management

1. Encourages the team to be responsible for determining the methods, procedures, and schedules with which the work gets done

2. Urges the team to make its own decisions regarding who does what tasks within the team
3. Encourages the team to make most of its own work-related decisions
4. Encourages the team to solve its own problems
5. Encourages the team to be responsible for its own affairs
6. Encourages the team to assess its performance

Support social climate

1. Responds promptly to team member needs or concerns
2. Engages in actions that demonstrate respect and concern for team members
3. Goes beyond own interests for the good of the team
4. Does things to make it pleasant to be a team member
5. Looks out for the personal well-being of team members

Compose team

1. Selects highly competent team members
2. Selects team members who have previously worked well together
3. Selects team members that have previously worked well with the leader
4. Selects team members so there is the right mix of skills on the team
5. Selects highly motivated team members

Train and develop team

1. Makes sure the team has the necessary problem solving and interpersonal skills
2. Helps new team members learn how to do the work

3. Provides team members with task-related instructions
4. Helps new team members to further develop their skills
5. Helps the team learn from past events or experiences

Challenge team

1. Reconsiders key assumptions in order to determine the appropriate course of action
2. Emphasizes the importance and value of questioning team members
3. Challenges the status quo
4. Suggests new ways of looking at how to complete work
5. Contributes ideas to improve how the team performs its work

Perform team task

1. Will “pitch in” and help the team with its work
2. Will “roll up his/her sleeves” and help the team do its work
3. Works with team members to help do work
4. Will work along with the team to get its work done
5. Intervenes to help team members get the work done

Solve problems

1. Implements or helps the team implement solutions to problems
2. Seeks multiple different perspectives when solving problems
3. Creates solutions to work-related problems
4. Participates in problem solving with the team
5. Helps the team develop solutions to task and relationship-related problems

APPENDIX B

Virtual Team Scenarios

Prompt

You are about to read 4 scenarios which illustrate different management strategies adopted by a virtual team supervisor. Please carefully read the team's general information below before proceeding to the scenarios.

General Team Information

You are a member of a software architect team at a large technology company in the U.S. Your team's mission is to help customers anywhere in the world build customized online project management tools. Your team does everything from technical architecture to project programming to implementation to producing to engineering. The highly interdependent nature of your team's tasks requires extensive interactions among all members.

There are six members on the team (including you) and a team supervisor named Andy. The whole team never meets face-to-face as everyone lives in different regions in the U.S. You, Andy and another member are located on the East Coast, another member is in Texas while the remaining three members are in California.

High Guiding

Before the team's first meeting, Andy sent all the members detailed descriptions of the whole team's missions and values, as well as individuals' roles and responsibilities in addition to an on-boarding package prepared by HR. He also provided the team with a team agreement template concerning how members would

communicate with one another and requested each member to review it on their own. Then the team met virtually to brainstorm the best solutions for the team's particular needs regarding information, communication, and collaboration. To ensure that the team agreement would work, Andy scheduled a team meeting a month later to assess its efficacy and periodic check-ins after that. Andy also created a #TeamAlignment channel on the team's online collaboration platform where everyone can talk about any hard decisions they had to make and why they made it. Andy believed this channel can help any team member facing a similar dilemma determine what response would best align with the organization's and the team's established values.

The team members can negotiate among themselves for weekly work schedule but are required to attend stand-ups and retrospectives. Stand-ups are 10-minute daily status-report meetings where all members share what they did the day before, what they are doing that day, and if there is anything they are struggling with. Everyone then posts an update on the team's online collaboration platform after the meeting. Retrospectives are also regular meetings, often held every two weeks. Whereas stand-ups are about checking in to see what specific tasks people are working on, retrospectives are about checking in on how the team is doing as a whole. They are facilitated feedback sessions for sharing progress, raising issues, and discussing solutions. Andy also uses retrospectives to update the team on what is happening, both in the market and within the company, that can impact their established strategies. Quarterly, Andy hosts a one-hour workshop where the team evaluates itself in several categories such as product quality, teamwork, and support.

Low Guiding

In the beginning, each member was sent an on-boarding package prepared by HR. Other than that, the team has no specific team protocols on information, communication, and collaboration among team members. Everyone has their own methods to determine how they should communicate with each other and how to know who is doing what. For example, some members tend to use emails to resolve conflicts while others prefer video conferences or phone calls. Some members just check emails once or twice a day while others send important, urgent requests via emails and expect immediate responses from their colleagues. Everyone, therefore, usually has to learn each other's working styles and adapt accordingly when collaborating. Andy barely gets involved in setting team structures and processes and often makes impromptu decisions. Except for Andy, only members working closely together are aware of each other's roles and responsibilities. The remaining members often have a vague understanding of what is going on with others.

Team members are expected to follow normal business hours. Andy wants to minimize time spent on meetings, so the team gets to meet as a whole only once a month and on special occasions, such as the annual performance evaluation meeting. Progress status is reported directly to Andy on an as-requested basis. Oftentimes, check-ins occur with Andy asking for updates on a specific task and pushing the member to work faster or leaving no comments at all. If there are issues that members can't find the answers to themselves, they can briefly discuss with Andy during the check ins. In addition to their main tasks, Andy believes it is the

responsibility of the team to be proactive in staying current with what is happening both in the market and within the company—especially events that can impact each individual's established strategies. If members become aware of any important information, they are required to report to Andy as soon as possible.

High Empowering

Andy makes sure that all the team members are supplied with critical work equipment such as computers, headsets, software, and applications to be able to conduct high-bandwidth communication and to do their job. Further, he constantly looks at new ways of helping the team collaborate remotely. When coming across something useful, he works with the members to find the best way to integrate it into their work routine. Andy also encourages the team to let him know what additional tools they need and will set aside time during team meetings to discuss those tools. Andy also frequently updates the team on what is going on in the organization. He, along with the leaders of the marketing, design, and legal teams, attempt to organize virtual lunches every three months for their members as these teams collaborate closely on a regular basis. Everybody can use this opportunity to understand what other teams are working on and how to collaborate more effectively.

Andy has always made it clear that he wants the team to be proactive and it is the team that is in charge of identifying and sharing best work practices. For example, Andy often gets everyone on the team to coach each other in their respective areas of expertise, assigns them as mentors to help on-board new members, and asks them to take turns facilitating team-building activities. While

letting the team self-manage, he checks in often, asking them about their work progress as well as their emotional states. He helps them recognize their feelings and introduces them to resources available to help improve their well-being. Every Friday, the team has a half-hour social session where the only rule is “no shop talk. And once a month, on a Thursday night, everybody gets together with a drink and takes turn hosting virtual happy hours. At the most recent happy hour, the team learned how to make shadow puppets with just paper and string.

Low Empowering

Andy thinks all the members should be able to procure on their own most of the work equipment—such as computers and headsets—that is essential to engage in high-bandwidth communication and to do their job. However, he works with the company to provide the team with a basic set of project management and communication apps and software. Whenever the team receives new resources, Andy normally lets them figure things out on their own, especially in terms of how the resources can be integrated into their everyday work routine. Andy believes what the company has provided so far is good enough and his team should make the best of it. Andy rarely updates his members on what is happening with other teams and departments because he thinks his team should just focus on their work. Despite collaborating closely with the marketing, design, and legal teams on a regular basis, Andy’s team has few opportunities to build relationships with them and understand their work projects.

Since the beginning, Andy has made it clear that every decision must go through him before being executed and that it is he who is held accountable for the team's performance, so his decisions are final. Whenever the team works on a new project, Andy will suggest what he thinks are best practices. Members can express disagreement and propose alternatives if they would like to, but Andy does not explicitly encourage that. He tends not to communicate much with his team outside of work. He believes they are able to resolve their own emotional problems by themselves and it is not necessary for a leader to get involved in this aspect of the team. Andy rarely attends social events but allows the team to organize them as long as they are not within business hours and do not affect the team's work. Andy is unsure of whether the team still has social events anymore and if so, how often they are organized.

APPENDIX C

Attention Checks (Study 2)

Based on the general team information above, choose the correct answer for each question below.

1. How interdependent is the team?
    a. Not at all
    b. Only a little
    c. Very much
2. How many members are there on the team (excluding the team supervisor Andy)?
    a. 2
    b. 6
    c. 15
3. The team members are geographically dispersed and never get to meet each other in-person.
    a. TRUE
    b. FALSE

Manipulation Checks (Study 2)

Guiding

1. Develops and articulates a clear team mission *(Define mission)*
2. Ensures that the team has clear performance goals *(Establish expectations and goals)*

3. Defines and structures own work and the work of the team *(Structure and plan)*
4. Monitors team and team member performance *(Monitor team)*
5. Helps the team interpret internal or external events *(Sense-making)*
6. Reviews relevant performance results with the team *(Provide feedback)*

Empowering

7. Helps different teams, communicate with one another *(Manage team boundaries)*
8. Makes sure that the equipment and supplies the team needs are available *(Provide resources)*
9. Encourages the team to be responsible for its own affairs *(Encourage team self-management)*
10. Looks out for the personal well-being of team members *(Support social climate)*

Individual Empowerment (Spreitzer, 1995)

1. The work I do is very important to me.
2. My job activities are personally meaningful to me.
3. The work I do is meaningful to me.
4. I am confident about my ability to do my job.
5. I am self-assured about my capabilities to perform my work activities.
6. I have mastered the skills necessary for my job.
7. I have significant autonomy in determining how I do my job.

8. I can decide on my own how to go about doing my work.
9. I have considerable opportunity for independence and freedom in how I do my job.
10. My impact on what happens in my team is large.
11. I have a great deal of control over what happens in my team.
12. I have significant influence over what happens in my team.

Intention to Engage in Leadership Behaviors (modified—Hiller et al., 2006)

1. I work with others in deciding how to go about our team's work.
2. I work with others in finding solutions to problems affecting team performance.
3. I join others in fostering a cohesive team atmosphere.
4. I help to develop other members' skills.
5. I share with others in taking on leadership responsibilities.