Shared Leadership in a Simulated High Stakes Environment

By

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ABSTRACT

Shared leadership is an increasingly relevant approach to team dynamics in complex, high-stakes environments. This thesis explores how vertical leadership styles (initiating structure, transactional, and transformational), individual adaptive capacity, and teamwork influence the development of shared leadership. Using archival data collected over a five-year period from the NASA Flight Operations Center – Unified Simulation (FOCUS) Lab at Middle Tennessee State University, the study analyzes how leadership perceptions and behaviors affect shared leadership emergence within simulated aviation dispatch center teams. Participants included undergraduate students assigned to specialized operational roles in teams of approximately ten. Measures included self-assessments by formal leaders and peer ratings of leadership behavior, adaptability, and teamwork. Results revealed that team member perceptions of transactional leadership were positively associated with shared leadership, while team perception of leadership's initiating structure exhibited a moderate negative relationship. Transformational leadership showed a positive correlation with shared leadership, although the results were constrained by data limitations. Individual adaptive capacity and teamwork did not significantly predict shared leadership emergence. These findings offer implications for leadership development, especially in environments requiring coordinated decision-making and distributed expertise.

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CHAPTER 1: INTRODUCTION

Traditionally, leadership has been viewed as a top-down structure, where a single individual holds authority over their subordinates in a vertical hierarchy (Pearce & Conger, 2003). As a result, much of the research has focused on the actions and behaviors of a singular leader directing their team. In hierarchical management models, leadership revolves around planning, organizing, and delegating tasks while maintaining strict control to ensure results (Block, 1981). This approach assumes that leaders must command from above while subordinates conform from below (Block, 1981). However, this rigid perspective is evolving. In today's fast-paced, dynamic global economy, organizations and teams must quickly adapt to shifting environments, not just to survive but to thrive. As a result, leadership has shifted from rigid control to a more collaborative, shared approach (Wilhelm, 2013). In 2020 a worldwide pandemic disrupted and irrevocably altered how and where teams and leadership functioned. In 2025 DOGE began the elimination of hundreds of FAA positions, shrinking flight dispatch centers' workforce, this modulated the reorganization of leadership. Although this study's research is based on 2013-2018 archival data gathered from a collegiate simulated flight dispatch center, it may serve as a reference baseline study for current and future leadership research. The initial following sections provide an overview of major leadership theories before this study explores shared leadership in relation to vertical leadership and examines possible key individual and team factors that may foster its emergence. Specifically, it investigates how vertical leadership interacts with shared leadership among key personnel in a simulated flight dispatch center.

Literature Review

Defining Shared Leadership.

Shared leadership can be a conceptually diffuse construct, which makes it essential to define the term precisely before evaluating its relationship with vertical leadership and the antecedents and contextual conditions that enable its emergence (Sweeney et al., 2019). Shared leadership thrives when individual team members influence the direction of tasks and the behavior of other members (Yukl, 1989). It is considered an emergent property that results from distributing leadership influence across team members rather than locating it in a formally appointed individual (Carson, Tesluk, & Marrone, 2007). In this respect, shared leadership can be viewed as a process reliant on the quality and enactment of leadership behaviors by multiple individuals within a group context.

Unlike vertical leadership, which stems from a preassigned authority structure, shared leadership allows team members to exert influence based on their task-relevant knowledge, skills, and abilities (Pearce, 2009). Pearce and Conger (2003) emphasize that even leadership models such as transformational or charismatic leadership, while progressive in tone, still assume a hierarchical framework wherein the formally designated leader retains primary control over vision and decision-making. Thus, shared leadership must be conceptually distinguished by the horizontal diffusion of influence and the possibility of reciprocal leadership roles among peers.

Decision-making autonomy at the individual level has been associated with more collaborative accountability for outcomes and enhanced efficiency under conditions where shared leadership is viable (Hoch, Pearce, & Welzel, 2010). However, as Hackman

(2002) notes, successful implementation of shared leadership depends heavily on clarifying the scope of a team's authority. He identifies four escalating levels of team self-management: (1) execution of tasks using physical or mental effort, (2) monitoring and managing the task process through feedback and corrective action, (3) designing the performing unit and structuring its resources and (4) setting the team's overall direction, including goals and strategy. It is essential to delineate the authority boundaries at the outset so that team members are fully aware of the decisions that fall within their domain (Hackman, 2002).

Wang et al. (2014) conducted a meta-analysis that supports the efficacy of shared leadership, finding a positive correlation ($r = .34$) between shared leadership and team performance. This relationship was especially pronounced in teams engaged in complex tasks. Shared leadership was also associated with higher levels of team creativity, suggesting that the dispersion of leadership functions can contribute to broader performance benefits. Nicolaides et al. (2014) further extended this line of inquiry by identifying antecedents, mediators, moderators, and outcomes of shared leadership. They reported that shared leadership was more strongly associated with team outcomes when it was measured using social network analysis. Additionally, task interdependence moderated the relationship between shared leadership and effectiveness, with higher interdependence strengthening this connection.

Pearce (2009) proposes that shared leadership may involve structurally distinct forms, such as shared roles with formally equal authority (e.g., co-leaders) or informal cooperation across different roles based on situational expertise. These configurations suggest that shared leadership is not a monolithic construct but rather a dynamic process contingent on context, task structure, and interpersonal dynamics among team members.

When implemented with structural clarity and contextual appropriateness, shared leadership can enable teams to optimize the deployment of expertise and improve adaptability. However, scholars note that its implementation often meets resistance due to the durability of traditional leadership norms embedded within organizational hierarchies (Pearce, 2009; Hackman, 2002). Therefore, understanding both the conceptual structure and the conditions that enable shared leadership is essential for evaluating its viability within complex team systems.

Why Shared Leadership is an Important Topic of Research.

As organizational environments grow increasingly complex, there is a corresponding need for compositional flexibility in leadership structures. The rise of organic organizational designs and the growing emphasis on adaptive performance underscore the strategic importance of understanding shared and distributed leadership models (Day, Gronn, & Salas, 2004). These models reflect an evolution from rigid hierarchical structures toward systems that rely more heavily on lateral influence and team-based authority.

This shift has been further accelerated by global disruptions such as the COVID-19 pandemic, which forced many organizations to adopt virtual team configurations. In these distributed contexts, responsibilities are often shared among team members, requiring coordination mechanisms that diverge from traditional vertical leadership (Ensley, Hmieleski, & Pearce, 2006). The structure and coordination of teams, particularly virtual or knowledge-based teams, significantly influence team effectiveness and necessitate a form of leadership that is dynamic and collectively enacted (Norback & Espinosa, 2019).

In knowledge-intensive environments, conventional top-down leadership structures may be insufficient for promoting team effectiveness. Instead, leadership that emerges based on domain expertise, task relevance, and collaborative interaction is often better suited to facilitate high performance (Hooker & Csikszentmihalyi, 2003). Empirical evidence from applied domains, including healthcare and sports, suggests that shared leadership is positively associated with improved organizational performance and innovation, especially in high-stakes or "just-in-time" operational settings (Kukenberger, Mathieu, & Ruddy, 2019). These findings are especially relevant in environments such as air traffic navigation, where changing conditions demand swift, coordinated, and decentralized decision-making.

Understanding the mechanisms by which leadership can be shared across a team is, therefore, not only a theoretical concern but also a practical imperative for modern organizations navigating uncertain and fast-paced conditions.

Overview of Traditional (Vertical) Views of Leadership

Traditional or vertical approaches to leadership describe models in which authority and decision-making flow from the top down within a formal hierarchy. Several foundational theories contribute to this view. One of the earliest is the trait approach, which, though not a fully developed theory, laid the groundwork for early leadership research (Fleenor, 2006). Trait theory posits that leadership effectiveness stems from innate personal characteristics such as intelligence, confidence, and sociability that distinguish leaders from non-leaders (Edem, 1987; Gardner, 1989). The assumption is that individuals possessing certain inherent traits will be effective leaders across a wide range of situations. However, empirical support for trait-based universalism has been limited, and its predictive validity has been questioned (Fleenor, 2006).

To address these limitations, the style approach emerged, shifting the focus from traits to observable leader behaviors. This approach emphasizes how leaders combine task-oriented behaviors (focused on goal achievement) and relationship-oriented behaviors (focused on interpersonal processes) to guide follower performance (Northouse, 2007; McCaffery, 2004).

Building on these foundations, contingency theories integrated situational variables, proposing that leadership effectiveness results from the interaction between leader traits or behaviors and contextual factors (Fleenor, 2006). While all three frameworks; trait, style, and contingency, are rooted in vertical leadership models, they each attempt to explain how leadership influence is best exercised from a formal position of authority.

One extensively studied element of vertical leadership is "initiating structure," a behavioral construct derived from the Ohio State University leadership studies. Initiating structure refers to the extent to which a leader defines roles, establishes clear communication patterns, and directs task-related activities to ensure goal attainment (Fleishman, 1973; Keller, 2006). Leaders high in initiating structure clarify expectations, formalize team processes, and maintain control over workflow through top-down influence. Meta-analytic research confirms that initiating structure is moderately associated with leadership outcomes, such as individual performance and group task completion (Judge, Piccolo, & Ilies, 2004).

Importantly, initiating structure has also been empirically linked to shared leadership under certain conditions. Wang et al. (2014) found a positive correlation between traditional vertical leadership and traditional shared leadership indicating that while conceptually distinct, the two may reinforce each other under certain behavioral frameworks. Additionally, Keller (2006) found that initiating structure predicted project team performance, providing further support for its relevance in structured, high-accountability environments. These findings support the idea that vertical leadership behaviors such as defining roles and clarifying expectations, may contribute to the scaffolding that enables shared leadership to emerge, particularly in highly structured or regulated environments like aviation or healthcare.

Wang et al. (2014) also found a stronger correlation between shared and vertical leadership when examining "new-genre" models such as transformational leadership. However, because the measures in the present study align more closely with traditional leadership constructs, including initiating structure, the traditional comparisons are most applicable. Taken together, the findings of Wang and Keller suggest a conceptual bridge between structured vertical leadership and the successful emergence of shared leadership, reinforcing the relevance of the present research question.

In summary, traditional leadership theories emphasize hierarchical control and role differentiation, offering valuable frameworks for understanding formal leadership. However, empirical research suggests that some elements of vertical leadership, particularly initiating structure, may serve as functional precursors to shared leadership under the right conditions. This warrants further investigation into the mechanisms by which formal authority and distributed leadership coexist and interact within high-performance team systems.

Research Question 1.

What is the nature of the relationship between initiating structure of FOC leadership and shared leadership?

Transactional Leadership

Transactional leadership is a foundational form of vertical leadership characterized by hierarchical control and formal exchanges between leaders and followers (Muczyk & Reimann, 1987). The concept originated in Max Weber's (1947) distinction between transactional and transformational forms of authority, and it was later formalized by Bass (1981) in his augmentation of transformational leadership theory. Rooted in expectancy theory, transactional leadership is based on the principle that individuals are motivated by clear rewards tied to performance and compliance with established procedures (Pearce, 2009; Lekganyane, 2022).

Transactional leaders operate through contingent reinforcement, emphasizing task completion, role clarity, and measurable outcomes. This can be expressed through explicit performance agreements, standardized goals, and recognition or reward for goal achievement (Ensley, Hmieleski, & Pearce, 2006). In these frameworks, the leader-follower relationship is defined by negotiated exchanges rather than shared influence or collaborative decision-making.

Empirical research has demonstrated that transactional leadership can be effective in stable, structured environments where goals and tasks are clearly defined. For example, Pearce (2009) notes that transactional leadership is well-suited to routine work systems where compliance and efficiency are critical. In these contexts, transactional behaviors can enhance employee performance by reinforcing expected behaviors through consistent feedback and reward mechanisms.

Judge, Piccolo, and Ilies (2004) conducted a meta-analysis examining leadership behaviors and their effectiveness, finding that transactional leadership was positively correlated with both follower satisfaction and performance. These findings support the functional utility of transactional leadership in certain task environments, especially where structure and predictability are prevalent.

Importantly, recent research also suggests that transactional leadership may have relevance to the development of shared leadership in team contexts. Wang, Waldman, and Zhang (2014), in a meta-analysis of 42 studies, found a moderate positive correlation ($\rho = .38$) between traditional vertical leadership behaviors (including transactional forms) and shared leadership. This indicates that while transactional and shared leadership differ in form, the structuring, clarifying, and reinforcing functions of transactional leadership may contribute to the foundation upon which shared leadership behaviors can emerge, particularly in interdependent work teams.

These findings support the relevance of the current research question: whether transactional leadership may positively influence the emergence or effectiveness of shared leadership in high-stakes or high-reliability environments. Given that transactional leadership emphasizes clarity, consistency, and behavioral reinforcement are factors that could support distributed coordination and its potential to enable shared leadership warrants empirical examination.

Research Question 2.

Does transactional leadership affect shared leadership?

Transformational Leadership

Transformational leadership is a form of vertical leadership that emphasizes the leader's ability to inspire, motivate, and intellectually stimulate team members while providing individualized consideration. This approach has been positively associated with perceived meaningfulness of work and with reducing team member role conflict through consistent and purpose-driven communication (Nielsen & Daniels, 2011). Bass (1985) identified four key dimensions of transformational leadership: idealized influence (also known as charisma), inspirational motivation, intellectual stimulation, and individualized consideration. Through these behaviors, transformational leaders articulate a compelling vision, act as role models, adapt their approach to individual needs, and challenge team members to utilize their own skills and insights to solve problems and drive innovation.

Because transformational leadership encourages autonomy, competence, and self-efficacy, it may provide a fertile foundation for the development of shared leadership. Wang, Waldman, and Zhang (2014) found that transformational leadership was positively associated with shared leadership, in part because transformational behaviors enhance team members' sense of empowerment and creativity and are two variables that indirectly facilitate the distribution of leadership influence within teams.

Empirical support for this relationship has also been found in studies of collaborative professional networks. For example, in a coalition of multi-institutional educational organizations, transformational leadership fostered a sense of shared purpose, trust, and joint responsibility among its members. Mullen and Frase (2000) observed that transformational leaders empowered members by encouraging initiative and distributed decision-making. They referred to the guiding principle articulated by Cunningham and

Gresso (1993): "An excellent organization is not about power; it is about empowerment" (p. 18). In the teacher's coalition they studied, transformational leadership practices promoted equal status among team members, enabling each to proactively influence the purpose and operations of their respective organizations (Mullen & Frase, 2000).

Together, these findings suggest that transformational leadership may act as a catalyst for shared leadership by fostering the psychological and relational conditions that support distributed influence. By enhancing self-efficacy, promoting creative engagement, and aligning individual and team-level goals, transformational leadership may indirectly facilitate the emergence of peer-to-peer leadership behaviors.

Research Question 3.

Does transformational leadership facilitate shared leadership?

Shared Leadership.

Shared leadership may be becoming the new standard for how to get maximum performance out of teams and groups (Pearce et al., 2009). However, the complexities of shared leadership make research challenging, as using aggregate theories to demonstrate effects on team performance tends to yield smaller effect sizes. Additionally, the nature of behaviors directly related to shared leadership may differ significantly from those typically observed in traditional vertical leadership models (D'Innocenzo et al., 2016). Prior research has attempted to use vertical leader constructs such as transformational and transactional leadership to explore a range of behaviors believed to contribute to the emergence of shared leadership. However, the conceptual and measurement overlap across these studies has made it difficult to isolate which leadership dimensions are genuinely unique to shared leadership and which are merely extensions of existing vertical constructs. This overlap has hindered the ability to conduct clean meta-analytic comparisons and has contributed to lingering ambiguity around how shared leadership operates, how it should be measured, and under what conditions it is most effective (D'Innocenzo et al., 2016). As a result, many important questions about the distinctiveness, mechanisms, and boundaries of shared leadership remain unresolved.

Is it possible that shared leadership may be facilitated by various forms of vertical leadership? Does the adaptive capacity of team members influence the emergence of shared leadership over time? What is the relationship among team members' perceptions of their traditional team leader, individual adaptive capacity traits, LBDQ (Leader Behavior Description Questionnaire) factors, teamwork, and shared leadership? And more specifically, what individual or organizational factors may predict levels of shared leadership in high-stakes work environments?

These questions are central to understanding how organizations might intentionally design work environments that promote the conditions necessary for shared leadership to thrive. As Andréas and Lindström (2008) noted, successful shared leadership is not solely a matter of formal design; it requires aligning personal characteristics, structural conditions, and selection mechanisms to support collaboration, distributed authority, and mutual influence. Recognizing the interaction among these factors is essential to identifying environments where shared leadership is more likely to emerge and be sustained.

This thesis will examine shared leadership relationships among key personnel within flight command dispatch centers. These centers require coordinated decision-making, continuous communication, and rapid adaptation to dynamic flight conditions, making them an ideal setting to explore factors that contribute to or constrain shared leadership. Such environments rely heavily on both individual expertise and collaborative performance, highlighting the need for leadership models that are more fluid and team-centered.

By using a simulated, knowledge-based operational setting, this research aims to identify the psychological, structural, and behavioral factors that may serve as prerequisites for the maturity of shared leadership. The hope is that findings from this study can inform organizational practices particularly in high-stakes environments by identifying the leadership behaviors and team dynamics most likely to support distributed influence and improve collective outcomes.

What are Flight Dispatch Centers?

A Flight Dispatch Center (FDC) functions as a centralized management hub that oversees the real-time operations of an airline. The FDC is responsible for coordinating all key operational functions, including crew scheduling, weather forecasting, flight planning, flight scheduling, and maintenance. The primary objective of a dispatch center is to ensure the safety of flight crews, airline personnel, and passengers, while also optimizing the airline's overall network of inbound and outbound flights.

For the purposes of this study, data were collected using a high-fidelity simulation environment designed to emulate the complexity of real-world flight operations. The Flight Operations Center - Unified Simulation (FOCUS) Lab at Middle Tennessee State University serves as the simulation site. This on-campus lab replicates the operations of a functioning flight dispatch center, allowing team members to collaboratively manage a virtual airline under realistic time and information constraints.

Effective leadership is essential for smooth and successful operations within each FOCUS Lab team. Student participants in the lab are assigned specific operational roles including: Flight Operations Coordinator (FOC), Schedule Management, Flight Planning, Passenger Management, Crew Scheduling, Weather Forecasting, and Maintenance Management. Each role contributes unique knowledge and responsibilities, and coordination among these positions is critical to ensuring mission success at making the FOCUS Lab a strong platform for examining shared leadership in a simulated high-stakes, knowledge-based environment.

Vertical Leadership in FOCUS Lab

Traditional vertical leadership can be defined as hierarchical leadership exercised by a formal team supervisor that exists within the FOCUS Lab between the Flight Operations Coordinator (FOC) and other members of the flight dispatch team. The FOC is considered the formal or designated leader of the team and is expected to use their influence to guide the group toward achieving mission objectives (Yukl, 2013). While this position reflects a clear vertical leadership role, the overall leadership dynamic in the FOCUS Lab is more complex.

Emphasizing leadership as a process, rather than a position, opens the door for leadership functions to be fulfilled by multiple team members across different situations (Carson, Tesluk, & Marrone, 2007). Flight operation centers, including those simulated in the FOCUS Lab, often rely on a collaborative decision-making model rooted in shared situational awareness and continuous information exchange. This approach allows for more distributed decision-making, enabling team members to leverage their individual areas of expertise.

It is crucial that flight dispatch environments utilize the knowledge and capabilities of the entire team to ensure safety and optimal performance. Shared leadership can support this need by giving individuals a sense of ownership over the problem and empowering them to generate insightful, context-specific solutions (Doyle & Smith, 2013).

In some cases, shared leadership may produce the most benefit when paired with elements of traditional vertical leadership, especially transformational leadership. He et al. (2019) found that transformational vertical leadership may support the conditions under which shared leadership thrives. Wang et al. (2014) also suggest that shared leadership and vertical leadership exert distinct effects on team performance, indicating they may function best when combined rather than treated as mutually exclusive.

However, some scholars remain skeptical. Locke (2003) argued that shared leadership may not be sufficient on its own and must be anchored in vertical leadership to maintain structure and accountability. Pearce (2004) described vertical leadership as leadership from a single authority figure at the top of a hierarchy, with other team members in follower roles. While such a structure may appear limiting, some level of formal leadership may always be necessary, especially in high-stakes environments to ensure coordinated action and clear accountability.

Finally, comparing transactional and transformational leadership styles may help us understand how formal leadership behaviors support the emergence of shared leadership. Bass (1997) suggested that transformational leaders, by focusing on empowerment and inspiration, may inadvertently encourage the very autonomy and initiative that underpins shared leadership.

Individual Adaptive Capacity

Adaptive capacity can be defined as the ability to adjust to potential changes, respond effectively to outcomes, and capitalize on opportunities as they emerge. From a social science perspective, an individual's adaptive capacity in the workplace is a key determinant of both personal and organizational success (Ployhart & Bliese, 2006). In today's workforce, employees face increasing external pressures such as technological disruption, operational complexity, and shifting demands that require ongoing adaptive responses (Ployhart & Bliese, 2006).

Within flight operations, some of the most critical moments occur during emergency situations that call for non-routine performance and quick decision-making under pressure (Doyle & Smith, 2013). However, adaptation is also essential in more routine but unpredictable challenges such as weather delays, unexpected maintenance issues, or sudden crew member unavailability. These scenarios require team members to think flexibly, manage uncertainty, and make effective decisions while coordinating with others.

In the FOCUS Lab, individual adaptive capacity is tested through simulation scenarios that contain embedded "trigger events." These events are designed to simulate realistic, non-scripted disruptions that require participants to engage in problem-solving, adjust plans, and work closely with others under evolving conditions. As in many knowledge-based environments, successful outcomes often depend on the collective expertise of the team not just individual performance. Thus, adaptability in this context requires not only technical skill but also the ability to collaborate effectively with people from different roles, backgrounds, and communication styles.

Ployhart (2006) emphasized that adaptability is a multidimensional trait that includes interpersonal, learning, and problem-solving dimensions. If team members exhibit strong adaptive traits, they may be more capable of collaborative behavior and more likely to assume leadership roles dynamically as the situation demands. This flexibility may, in turn, support the emergence of shared leadership by enabling individuals to step into and relinquish influence roles as needed.

Research Question 4:

Do individual adaptive capacity traits facilitate shared leadership?

Teamwork

Teamwork can be understood as a conceptual framework encompassing the explicit actions of team members working together to achieve a shared task goal (Rousseau, Aubé, & Savoie, 2006). These overt behaviors often follow a temporal flow, illustrating how a team "gets from here to there" in the course of accomplishing its mission (Rousseau et al., 2006). Marks, Mathieu, and Zaccaro (2001) define team processes as "members' interdependent acts that convert inputs to outcomes through cognitive, verbal, and behavioral activities directed toward organizing taskwork to achieve collective goals" (p. 357).

In high-stakes environments such as aviation, many incidents and failures are not the result of technological malfunction, but rather of breakdowns in communication and coordination. This makes effective teamwork not just helpful, but essential (Grote, 2016). While teamwork and shared leadership may appear to be similar constructs, important distinctions exist. Teamwork reflects the cooperative processes that enable individuals to pool their inputs toward collective outputs, while shared leadership focuses more on the distribution of influence and decision-making responsibility among team members (Carson, Tesluk, & Marrone, 2007).

A unique feature of flight operations is that teams are often ad hoc, formed based on rotating work schedules or shift coverage. This makes it necessary for teams to establish a collaborative mode of operation quickly (Zijlstra, Waller, & Phillips, 2012). One possible avenue for accelerating this team development process is through fostering shared leadership as an early norm. While there is limited research directly linking teamwork and shared leadership (Fletcher & Kaufer, 2003), it seems plausible that a mutually reinforcing relationship exists between the two. For example, teams that regularly engage in high-quality teamwork (e.g., backing each other up, coordinating, and sharing responsibility) may naturally foster an environment where shared leadership is more likely to emerge.

Conversely, shared leadership may develop when teamwork requirements are especially high. That is, the more interdependent and cognitively demanding the task, the more likely it is that multiple individuals will need to step into leadership roles based on their expertise. However, Small and Rentsch (2010) argue that shared leadership is not simply the implicit byproduct of teamwork behaviors but may function as a distinct and explicit leadership process, with its own motivational and influence-related dynamics that differ from traditional leadership constructs like transformational or transactional leadership.

Past longitudinal research has found that shared leadership is positively related to team performance but also shows unique patterns when compared to other team characteristics, such as collectivism (Small & Rentsch, 2010). These findings raise the possibility that teamwork and shared leadership are connected, but not interchangeable and understanding their relationship may be key to improving team design in environments like flight operations.

Another important consideration when examining teamwork and shared leadership is the team setting in which they are studied. Some scholars have raised concerns that student teams, such as those used in laboratory or classroom environments may not fully represent real-world organizational settings (Peterson, 2001). This concern has prompted researchers to examine whether the context of the team moderates the relationship between shared leadership and team outcomes. However, findings on this issue remain mixed. For instance, D'Innocenzo et al. (2014) suggested that stronger relationships between shared leadership and team outcomes are observed in field settings compared to academic ones. In contrast, both Nicolaides et al. (2014) and Wang et al. (2014) argued that team setting has no significant moderating effect, indicating that well-constructed simulation environments can still yield meaningful insights into team dynamics. Given the high-fidelity, task-relevant design of the FOCUS Lab, this study aims to balance simulation control with applied relevance to real-world aviation operations.

Research Question 5

Is shared leadership more likely to develop when teamwork requirements are high?

CHAPTER II: METHOD

Participants

Participants were undergraduate students enrolled in an aerospace program at Middle Tennessee State University. The study was conducted in the university's Flight Operations Center Unified Simulation (FOCUS) Lab, a high-fidelity simulation environment that replicates a commercial airline dispatch center. In the lab, students were assigned to operational roles and worked together as teams to manage a virtual airline. These teams were responsible for making real-time decisions related to simulated flight operations under dynamic, time-sensitive conditions.

Student roles included Flight Operations Coordinator, Schedule Management, Fuel and Load Management, Crew Scheduling, Weather and Forecasting, Rescheduling Coordinator, and Maintenance Management. Participants who were assigned to roles such as Pilot or Ramp Coordinator were excluded from the study, as these positions were not considered central to the core decision-making team structure within the FOCUS Lab environment.

The participant pool was drawn from aerospace students enrolled between 2013 and 2018 in a capstone course that required participation in the FOCUS Lab as a curricular component. While lab participation was mandatory for course completion, participation in the research component of the study was voluntary, and students gave informed consent to allow their data to be used for research purposes. No compensation was provided. Team assignments typically comprising approximately ten students were determined by the course instructor based on students' aerospace major concentration. In total, data were collected from approximately 33 student teams.

Procedure

The Flight Operations Center Unified Simulation (FOCUS) Lab at Middle Tennessee State University is a high-fidelity simulation environment designed to emulate a real-world airline flight dispatch center. Viewing monitors display current weather conditions, radar tracking of in-progress flights, and a real-time representation of the airline's flight schedule. Participants work at individual computer stations equipped with headsets, job-aid materials, and control interfaces that allow them to manage various operational aspects of the virtual airline.

Students were seated around a rectangular table, enabling communication through multiple channels; verbal, nonverbal, and text-based messaging. The simulation is designed to promote cross-specialization coordination by requiring team members to integrate information across roles and work collaboratively to address evolving operational scenarios. The training process used in the FOCUS Lab is structured to develop these cross-role coordination skills (Littlepage, Hein, Moffett, 2016).

This study utilized archival data collected from prior FOCUS Lab cohorts. Institutional Review Board (IRB) approval was obtained, and formal permission was granted to access and analyze the archival data for research purposes.

Design and materials

This study used a correlational design to examine the relationships between vertical leadership behaviors, shared leadership, and team-level perceptions. In all FOCUS Lab teams, the Flight Operations Coordinator (FOC) served as the designated vertical leader, consistent with the traditional hierarchy used in flight dispatch centers. Each FOC rated their own leadership behaviors using standardized measures (see

Appendix A). In turn, team members rated their FOC on these same leadership dimensions and also completed items assessing perceptions of shared leadership (see Appendix A), teamwork (see Appendix B), and adaptive capacity (see Appendix C) within the team

Initiating Structure

To measure leadership structure behaviors, participants completed the Initiating Structure subscale from the Leadership Behavior Description Questionnaire (LBDQ) Form XII, developed at Ohio State University (Stogdill, 1963) presented in Appendix A. This scale consists of 10 items; each rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The FOC completed a self-rating, and each team member completed the same scale to provide observer ratings of the FOC's initiating structure behaviors. Initiating structure refers to task-focused behaviors such as defining roles, setting goals, and clarifying expectations.

Transformational leadership was assessed using a 12-item measure adapted from Podsakoff et al. (1990) see Appendix A. The measure includes four components:

- Providing an Appropriate Model (Idealized Influence)
- Fostering the Acceptance of Group Goals
- High Performance Expectations
- Providing Individualized Support (Individualized Consideration)

These behaviors are traditionally measured using dimensions of task-focused leadership (i.e., initiating structure) included in the Leader Behavior Description Questionnaire XII (LBDQ; Stogdill, 1962) and dimensions of transformational leadership using the Transformational Leadership Inventory (TLI; Podsakoff et al., 1990) as presented in Appendix A.

These scales were completed by both the FOC (self-assessment) and by team members (leader ratings). Items were rated on the same 5-point Likert scale. This measure has been widely used in organizational research and is grounded in leadership theory that links transformational behaviors to improved follower motivation and team performance.

Transactional leadership was assessed using a subset of items adapted from Podsakoff (1990), focusing on contingent reward behavior and goal setting. Both self-reports (by the FOC) and team member ratings were collected. These items align with traditional vertical leadership behaviors that emphasize role clarity, structure, and performance-reward contingencies.

Shared leadership was measured via team member perceptions using a short scale that asked participants to rate the degree to which multiple team members contributed to leadership functions during the simulation. This construct reflects the extent to which influence and decision-making responsibilities were distributed across the team rather than concentrated in a single individual.

Cronbach's alpha was computed for each scale to assess internal consistency reliability. Only scales demonstrating acceptable internal reliability ($\alpha \geq .70$) were retained for analysis.

Design and Internal Validity

This study used an archival correlational design to examine relationships between vertical leadership behaviors, individual traits, teamwork, and shared leadership within simulated airline dispatch teams. Data were collected from teams participating in the FOCUS Lab across a five-year span (2013-2018). Each team worked in the lab across two or three 3-hour sessions, during which they operated a simulated airline under dynamic and time-sensitive scenarios. The data were drawn from multiple cohorts of undergraduate students completing a capstone aerospace course, with team assignments varying by semester and student specialization.

Because this study is non-experimental, causal inferences about variable relationships cannot be definitively established. However, the internal validity of the FOCUS Lab is supported by its high-fidelity simulation design. The lab incorporates real-world goals, professional aviation protocols, and complex decision-making demands that mirror those in actual flight operations. This design contributes to strong face validity, as the simulation convincingly resembles a real airline operations center in both structure and task demands.

In addition, the FOCUS Lab provides psychological fidelity by engaging participants in authentic roles with real-time responsibilities. This helps reduce demand characteristics or behavior changes that may occur when individuals know they are being studied, thus supporting more ecologically valid observations of leadership and teamwork processes.

Overall, the extended time frame of the data collection, the diversity of team compositions, and the realism of the simulation environment all contribute to the appropriateness of the design for studying shared leadership and related team dynamics in a controlled-yet-authentic setting.

Internal consistency for scales will be evaluated using coefficient alpha. Inter-rater agreement will be assessed using intraclass correlation. The research questions will be examined using correlations.

CHAPTER III: RESULTS

This section presents the findings from analyses conducted to address the five research questions concerning the relationship between vertical leadership behaviors, individual traits, teamwork, and the emergence of shared leadership within simulated flight dispatch teams. Descriptive statistics, Pearson correlations, and multiple regression analyses were used to evaluate the hypotheses.

Descriptive Statistics

Descriptive statistics, shown in Table 1, were computed for all key variables assessed across the five research questions, including initiating structure, transactional and transformational leadership, adaptive capacity, teamwork, and shared leadership. These statistics are organized by source type (i.e., self-report versus team member perceptions). Across the samples, scores ranged from 3.64 to 4.23, with standard deviations between 0.13 and 0.94. These values reflect moderate variability in leadership and teamwork perceptions across roles and rating sources.

Table 1

Descriptive Statistics for Key Variables

Variable	Source	Mean	SD	N
Initiating Structure	Self-Report (FOC)	3.96	0.14	32
Initiating Structure	Team Member Ratings of FOC	3.99	0.77	217
Transactional Leadership	Self-Report (FOC)	4.23	0.92	32
Transactional Leadership	Team Member Ratings of FOC	3.64	0.94	217
Transformational Leadership	Self-Report (FOC)	4.10	0.13	32
Transformational Leadership	Team Member Ratings of FOC	3.91	0.84	217
Shared Leadership	Team Member Ratings	3.85	0.82	338
Teamwork	Team Member Ratings	3.82	0.90	881
Adaptive Capacity	Team Member Self-Report	3.95	0.80	717

Test of Research Questions

Research Question 1. *What is the nature of the relationship between initiating structure of FOC leadership and shared leadership?*

Pearson correlation analyses were conducted to examine the relationship between the initiating structure factor and shared leadership indicators for both self-reported FOC leadership and member observations on FOC leadership.

When examining the relationship between FOC self-reported initiating structure behaviors and team member perceptions of shared leadership, the correlation was not statistically significant, r = −0.198, p = .584, indicating a weak negative relationship between how FOCs rated their own structuring behaviors and the emergence of shared leadership.

When examining the relationship between team member ratings of the FOC's initiating structure and team member perceptions of shared leadership, This analysis revealed a moderate negative correlation, $r = -0.570$, $p = .085$, which approached statistical significance. This suggests that when team members perceived their FOC as highly structured, shared leadership was less likely to emerge.

These findings indicate that perceptions of initiating structure, particularly from team members, may inversely relate to the development of shared leadership within high stakes simulated environments

Research Question 2. *Does transactional leadership affect shared leadership?*

When examining the relationship between FOC self-reported transactional leadership and team member perceptions of shared leadership, the correlation was **not** statistically significant, $r = -0.319$, $p = .601$, indicating a weak negative relationship between how FOCs rated their own transactional leadership and the emergence of shared leadership.

When examining the relationship between team member ratings of the FOC's transactional leadership and team member perceptions of shared leadership, This analysis revealed a very strong positive correlation, $r = 0.997$, $p < .001$, which was statistically significant. This suggests that when team members perceive their FOC as engaging in transactional leadership behaviors, such as providing feedback and recognition, shared leadership is more likely to emerge.

These findings suggest that team member perceptions of transactional leadership are strongly associated with shared leadership, while self-perceptions by formal leaders may not reflect the same relationship.

Research Question 3. *Does transformational leadership facilitate shared leadership?*

Transformational leadership, assessed through a 12-item scale adapted from Podsakoff et al. (1990), was strongly associated with shared leadership. As shown in Table 2, $r = .53$, $p < .001$, indicating that transformational behaviors such as modeling, individualized support, and fostering group goals were linked to higher levels of shared leadership within teams.

Research Question 4. *Do individual adaptive capacity traits facilitate shared leadership?*

A multiple regression analysis was conducted with individual adaptive capacity as the predictor and shared leadership as the outcome. The regression was not statistically significant, $F(1, 25) = 0.236$, $p = .631$, with an R^2 of 0.009, indicating that adaptive capacity explained less than 1% of the variance in shared leadership. The standardized coefficient for adaptive capacity was $\beta = 0.070$, $p = .631$, suggesting a weak and non-significant positive relationship. These findings suggest that, at the summary level, individual adaptive capacity traits do not significantly predict shared leadership. While adaptive capacity may be conceptually relevant to team dynamics, its statistical contribution to shared leadership in this dataset was minimal.

Research Question 5. *Is shared leadership more likely to develop when teamwork requirements are high?*

A Pearson correlation analysis was conducted using summary-level item means from the shared leadership and teamwork measures. The correlation was not statistically significant, $r = -0.285$, $p = .424$, indicating a weak negative relationship between teamwork requirements and shared leadership.

These findings suggest that, at the summary level, increased teamwork demands were not associated with higher levels of shared leadership. This result contrasts with theoretical expectations and may reflect limitations in the measurement structure or the complexity of the relationship between teamwork and leadership.

Table 2

Correlation Matrix Among Study Variables

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
1. Shared Leadership	1.00								
2. Initiating Structure (Self)	-0.20	1.00							
3. Transactional Leadership (Self)	-0.91	0.31	1.00						
4. Transformational Leadership (Self)	0.43	0.07	-0.49	1.00					
5. Initiating Structure (Member)	-0.57	-0.13	0.84	-0.67	1.00				

(Table Continues)

(Table 2. Continued)

	1	2	3	4	5	6	7	8	9
6. Transactional Leadership (Member)	-0.83 **	0.19	0.88	-0.67	0.95	1.00			
7. Transformational Leadership (Member)	0.53	-0.02	-0.69	0.80	-0.37	-0.83	1.00		
8. Adaptive Capacity	0.10	-0.24	0.17	0.02	0.17	0.41	0.29	1.00	
9. Teamwork	-0.40	-0.08	0.03	0.28	0.23	0.49	0.55	-0.34	1.00

CHAPTER IV: DISCUSSION

This study investigated the emergence of shared leadership within simulated flight dispatch centers, focusing on the influence of vertical leadership behaviors (e.g., initiating structure, transactional leadership, and transformational leadership) as well as individual adaptive capacity and teamwork requirements. Results from Pearson correlation and regression analyses revealed mixed relationships among these variables.

Initiating structure, as rated by team members, showed a moderate negative correlation with shared leadership, suggesting that more directive leadership may inhibit distributed influence (Yukl, 1989; Pearce & Conger, 2003). Transactional leadership, when rated by team members, demonstrated a strong positive relationship with shared leadership, indicating that contingent reinforcement and recognition may foster collaborative leadership dynamics (Carson, Tesluk, & Marrone, 2007). Transformational leadership could not be reliably assessed due to data limitations. Adaptive capacity and teamwork requirements showed weak and non-significant relationships with shared leadership.

Theoretical and Practical Implications

These findings support a nuanced view of hybrid leadership frameworks. While traditional vertical leadership behaviors may provide structural scaffolding, the emergence of shared leadership appears to be more strongly influenced by team member perceptions than by formal leader self-assessments (Hackman, 2002; Pearce, 2009). This aligns with theoretical models that emphasize the socially constructed nature of leadership and the importance of peer interactions in shaping leadership roles (Hoch, Pearce, & Welzel, 2010). The strong correlation between team-rated transactional leadership and shared leadership reinforces the idea that leadership is both structural and relational (Day, Gronn, & Salas, 2004).

Practical implications suggest that leadership development programs should prioritize team-based feedback mechanisms and emphasize observable behaviors that resonate with team members. Simulation-based environments such as the FOCUS Lab offer valuable opportunities to cultivate these dynamics. Organizations may benefit from designing team structures and cultures that support distributed decision-making, collaborative accountability, and recognition-based reinforcement.

Limitations and Future Research

Several limitations should be noted. First, the correlational design and use of archival data limit causal inference. Second, reliance on self-report and peer-report measures introduces potential for bias and misalignment. Future research should incorporate behavioral or performance-based indicators and consider longitudinal or experimental designs to examine leadership dynamics over time. Additionally, exploring mediating and moderating variables, such as psychological safety or team climate, could provide deeper insight into the mechanisms that support shared leadership (Pearce, 2009; Nicolaides et al., 2014).

Conclusion

This study contributes to the growing body of research on shared leadership by demonstrating that team member perceptions of transactional leadership are strongly associated with the emergence of distributed leadership in simulated flight dispatch teams. Other factors, such as initiating structure, adaptive capacity, and teamwork, showed weaker or non-significant relationships. These findings underscore the importance of peer-driven leadership dynamics and suggest that hybrid leadership models may be most effective when grounded in team-level feedback and interaction.

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APPENDICES

APPENDIX A: LEADERSHIP MEASURES

FOC Self-Report on Leadership

The following questions ask you about your overall leadership style during the FOCUS Lab simulation exercises. Please respond to each question using the scale below. Please answer openly and honestly. There are no right or wrong answers. There are no penalties or grades assigned to this evaluation, you will not receive any feedback based on your responses.

DIRECTIONS:
I. READ each item carefully.
II. THINK about how frequently YOU engage in the behavior described by the item.
III. DECIDE whether YOU (1) rarely, (2) occasionally, (3) sometimes, (4) frequently, or (5) usually engage in the described behavior.
IV. SELECT one of the five numbers…

1	2	3	4	5
Rarely, in less than 10% of instances.	**Occasionally**, in about 30% of instances.	**Sometimes**, in about 50% of instances	**Frequently**, in about 70% of instances.	**Usually**, in about 90% of instances.

Initiating Structure[i]

1. I schedule the work to be done.
2. I encourage the use of uniform procedures.
3. I let team members know what is expected of them.
4. I decide what shall be done and how it shall be done.
5. I make sure that my part in the team is understood by the team members.
6. I assign team members to particular tasks.
7. I maintain definite standards of performance.
8. I try out my ideas in the group.
9. I make my attitude clear to the team.
10. I ask that team members to follow standard rules and regulations

Transactional Leadership

11. I always give positive feedback when the team performs well.
12. I give special recognition when the team work is very good.
13. I commend team members when they do a better than average job.
14. I personally compliment team members when they do outstanding work.
15. *I do not acknowledge good performance of team members.

Transformational Leadership - Providing an Appropriate Model[ii]

16. I provide a good model for others to follow.
17. I lead by example.
18. I lead by "doing" rather than simply by "telling."

Transformational Leadership - Fostering the Acceptance of Group Goals[iii]

19. I foster collaboration among the different Universal E-line positions.
20. I get the team to work together for the same goal.
21. I develop a team attitude and spirit among employees.

Transformational Leadership - High Performance Expectations[iv]

22. I show the team that I expect a lot from them.
23. I insist on only the best performance.
24. I will not settle for second best.

Transformational Leadership - Providing Individualized Support (or Consideration) [v]

25. *I act without considering my team members' feelings.
26. I show respect for my team members' personal feelings.
27. *I treat the team without considering their personal feelings.

Note. TFL = Transformational leadership has four subdimensions of transformational leadership using the Transformational Leadership Inventory (TLI; Podsakoff et al., 1990). . * = reverse scores items. Items here are labeled according to their dimensions, but items are presented to respondents without dimensions labels.

Shared Leadership – FOC Observations

The following questions ask you about YOUR TEAM MEMBERS' during the FOCUS Lab simulation exercises. Please respond to each question using the scale below. Please answer openly and honestly. There are no right or wrong answers.

DIRECTIONS:
I. READ each item carefully.
II. THINK about how frequently YOUR TEAM (NOT INCLUDING YOURSELF) engages in the behavior described by the item.
III. DECIDE whether YOUR TEAM (NOT INCLUDING YOURSELF) (1) rarely, (2) occasionally, (3) sometimes, (4) frequently, or (5) usually engage in the described behavior.
IV. SELECT one of the five numbers…

1	2	3	4	5
Rarely, in less than 10% of instances.	**Occasionally**, in about 30% of instances.	**Sometimes**, in about 50% of instances	**Frequently**, in about 70% of instances.	**Usually**, in about 90% of instances.

(Share_Structure) Initiating Structure [vi]

1. My team schedules the work to be done.
2. My team encourages the use of uniform procedures.
3. My team lets its members know what is expected of them.
4. My team decides what shall be done and how it shall be done.
5. My team makes sure that its members understand their role on the team.
6. My team assigns members to particular tasks.
7. My team maintains definite standards of performance.
8. My team tries out its members' ideas in the team.
9. My team members make their attitudes clear to each other.
10. My team asks that its members follow standard rules and regulations.

(Share_TA) Transactional Leadership

11. My team always gives me positive feedback when I perform well.
12. My team gives me special recognition when my work is very good.
13. My team commends me when I do a better than average job.
14. My team personally compliments me when I do outstanding work.
15. My team DOES NOT acknowledge my good performance. (R)

(Share_TF_AM) Transformational Leadership - Providing an Appropriate Model

16. My team members provide a good model for me to follow.

17. My team members set the example.
18. My team members actively contribute to the team's work.

(Share_TF_FGG) Transformational Leadership - Fostering the Acceptance of Group Goals

19. My team fosters collaboration among the different Universal E-line positions.
20. My team works together to get each member to contribute toward the same goal.
21. My team develops a team attitude and spirit among employees.

(Share_TF_HPE) Transformational Leadership - High Performance Expectations

22. My team encourages each other to go above and beyond (e.g. extra effort).
23. My team insists on only the best performance.
24. My team will not settle for second best.

(Share_TF_PIS) Transformational Leadership - Providing Individualized Support

25. My team acts without considering my feelings. (R)
26. My team shows respect for my personal feelings.
27. My team treats me without considering my personal feelings. (R)

Shared Leadership – Team Member Observations

The following questions ask you about YOUR TEAM MEMBERS' during the FOCUS Lab simulation exercises. Please respond to each question using the scale below. Please answer openly and honestly. There are no right or wrong answers.

DIRECTIONS:

I. READ each item carefully.

II. THINK about how frequently YOUR TEAM (NOT INCLUDING THE FOC) engages in the behavior described by the item.

III. DECIDE whether YOUR TEAM (NOT INCLUDING THE FOC) (1) rarely, (2) occasionally, (3) sometimes, (4) frequently, or (5) usually engage in the described behavior.

IV. SELECT one of the five numbers…

1	2	3	4	5
Rarely, in less than 10% of instances.	**Occasionally**, in about 30% of instances.	**Sometimes**, in about 50% of instances	**Frequently**, in about 70% of instances.	**Usually**, in about 90% of instances.

(Share_Structure) Initiating Structure

1. My team schedules the work to be done.
2. My team encourages the use of uniform procedures.
3. My team lets its members know what is expected of them.
4. My team decides what shall be done and how it shall be done.
5. My team makes sure that its members understand their role on the team.
6. My team assigns members to particular tasks.
7. My team maintains definite standards of performance.
8. My team tries out its members' ideas in the team.

9. My team members make their attitudes clear to each other.
10. My team asks that its members follow standard rules and regulations.

(Share_TA) Transactional Leadership

11. My team always gives me positive feedback when I perform well.
12. My team gives me special recognition when my work is very good.
13. My team commends me when I do a better than average job.
14. My team personally compliments me when I do outstanding work.
15. My team DOES NOT acknowledge my good performance. (R)

(Share_TF_AM) Transformational Leadership - Providing an Appropriate Model

16. My team members provide a good model for me to follow.
17. My team members set the example.
18. My team members actively contribute to the team's work.

(Share_TF_FGG) Transformational Leadership - Fostering the Acceptance of Group Goals

19. My team fosters collaboration among the different Universal E-line positions.
20. My team works together to get each member to contribute toward the same goal.
21. My team develops a team attitude and spirit among employees.

(Share_TF_HPE) Transformational Leadership - High Performance Expectations

22. My team encourages each other to go above and beyond (e.g. extra effort).
23. My team insists on only the best performance.
24. My team will not settle for second best.

(Share_TF_PIS) Transformational Leadership - Providing Individualized Support

25. My team acts without considering my feelings. (R)
26. My team shows respect for my personal feelings.
27. My team treats me without considering my personal feelings. (R)

Intimating Structure and Self-Leadership

The following questions ask you about your habits and thoughts during the FOCUS Lab simulation exercises. Please respond to each question using the scale below. Please answer openly and honestly. There are no right or wrong answers.

DIRECTIONS:
I. READ each item carefully.
II. THINK about how frequently YOU engage in the behavior described by the item.
III. DECIDE whether YOU (1) rarely, (2) occasionally, (3) sometimes, (4) frequently, or (5) usually engage in the described behavior.
IV. SELECT one of the five numbers…

1	2	3	4	5
Rarely, in less than 10% of instances.	**Occasionally**, in about 30% of instances.	**Sometimes**, in about 50% of instances	**Frequently**, in about 70% of instances.	**Usually**, in about 90% of instances.

(Mem_Self_Structure) Initiating Structure

1. I schedule the work that I need to do.
2. I try to use my own uniform procedures in performance of my duties.
3. I make sure I understand what the team expects of me.
4. I decide what I need to do and how to do it.
5. I make sure I understand my part in the team.
6. I take on particular team tasks for myself.
7. I maintain definite standards of performance for myself.
8. I make sure I follow standard rules and regulations.
9. I try out my own ideas in the team.
10. I make my attitudes clear to the team.

Abbreviated Self-Leadership Questionnaire (ASLQ)

(Mem_SelfLead_#_BAV) Behavior Awareness & Volition

1. I establish specific goals for my own performance.
2. I make a point to keep track of how well I'm doing at work.
3. I work toward specific goals I have set for myself.

(Mem_SelfLead_#_CC) Constructive Cognition/Positive Self-Talk

4. I try to mentally evaluate the accuracy of my own beliefs about situations I am having problems with.
5. Sometimes I talk to myself (out loud or in my head) to work through difficult situations.
6. I think about my own beliefs and assumptions whenever I encounter a difficult situation.

(Mem_SelfLead_#_VSP) Visualizing Successful Performance

7. When I have successfully completed a task, I often reward myself with something I like.
8. I visualize myself successfully performing a task before I do it.
9. Sometimes I picture in my mind a successful performance before I actually do a task.

[i] Stogdill, R. M. (1963). *Manual for the leadership behavior description questionnaire – Form XII*. Ohio State University, Fisher College of Business. Retrieved February 26, 2019, from https://fisher.osu.edu/centers-partnerships/leadership/leader-behavior-description-questionnaire-lbdq

[ii] Podsakoff, P.M., S.B. MacKenzie., R.H., Moorman, & R. Fetter (1990). Transformational leader behaviors and their effects on followers' trust in leader, satisfaction, and organizational citizenship behaviors. The Leadership Quarterly. 1. 107-14

APPENDIX B: TEAMWORK QUESTIONAIRE

Teamwork Questionnaire[1]

Please use the following scale to describe your team that just completed the NASA lab simulation exercise.

To what extent does our team actively work to …

1	2	3	4	5
Not at all	**Very Little**	**To Some Extent**	**To a Great Deal**	**To a Very Great Extent**

1. Mission Analysis
_____1. Identify our main tasks?
_____2. Identify the key challenges that were expected?
_____3. Determine the resources that were needed to be successful?

2. Goal Specification
_____4. Set goals for the team?
_____5. Ensure that everyone on the team clearly understood the goals?
_____6. Link our goals with the strategic direction of the organization?

3. Strategy Formulation and Planning
_____7. Develop an overall strategy to guide the team activities?
_____8. Prepare contingency ("if-then") plans to deal with uncertain situations?
_____9. Know when to stick with a given working plan, and when to adopt a different one?

ACTION PROCESSES - SECOND ORDER FACTOR

4. Monitoring Progress toward Goals
_____10 Regularly monitor how well the team was meeting the team goals?
_____11. Use clearly defined metrics to assess team progress?
_____12. Seek timely feedback from stakeholders (e.g., customers, top management, other organizational units) about how well the team was meeting its goals?

5. Resource and Systems Monitoring
_____13. Monitor and manage team resources (e.g., financial, equipment, etc.)?
_____14. Monitor important aspects of the work environment (e.g., inventories, equipment and process operations, information flows)?
_____15. Monitor events and conditions outside the team that influence team operations?

6. Team Monitoring and Backup
_____16. Develop standards for acceptable team member performance?

_____*17. Balance the workload among the team members?*
_____*18. Assist each other when help was needed?*

7. Coordination
_____*19. Communicate well with each other?*
_____*20. Smoothly integrate member work efforts?*
_____*21. Coordinate activities with one another?*

INTERPERSONAL PROCESSES - SECOND ORDER FACTOR

8. Conflict Management
_____*22. Deal with personal conflicts in fair and equitable ways?*
_____*23. Show respect for one another?*
_____*24. Maintain group harmony?*

9. Motivating and Confidence Building
_____*25. Take pride in team accomplishments?*
_____*26. Develop confidence in the team's ability to perform well?*
_____*27. Encourage each other to perform their very best?*

10. Affect Management
_____*28. Share a sense of togetherness and cohesion?*
_____*29. Manage stress?*
_____*30. Keep a good emotional balance in the team?*

Note. Items 1 – 30 are presented to respondents with no labels. Scale was written and developed by Marks and Mathieu. Permission was given to the lab to use the scale for research purposes only.

Response options:
1 = Not at all
2 = Very little
3 = To some extent
4 = To a great deal
5 = To a very great deal

[1] Marks, M. A., Mathieu, J. E., & Zaccaro, S. J. (2001). A temporally based framework and taxonomy of team processes. *Academy of Management Review*, *26*(3), 356-376.

See also:

LePine, J. A., Piccolo, R. F., Jackson, C. L., Mathieu, J. E., & Saul, J. R. (2008). A meta-analysis of teamwork processes: tests of a multidimensional model and relationships with team effectiveness criteria. *Personnel Psychology, 61*(2), 273-307.

APPENDIX C: INDIVIDUAL ADAPTABILITY MEASURES

(I-ADAPT-M)[1]

This survey asks a number of questions about your preferences, styles, and habits at work. Read each statement carefully. Then, for each statement, indicate the number that best represents your opinion. There are no right or wrong answers. To what extent does our team actively work to …

Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree

1. I am able to maintain focus during emergencies
2. *I usually over-react to stressful news
3. I believe it is important to be flexible in dealing with others
4. I take responsibility for acquiring new skills
5. I tend to be able to read others and understand how they are feeling at any particular moment
6. In an emergency situation, I can put aside emotional feelings to handle important tasks
7. I see connections between seemingly unrelated information
8. I enjoy learning new approaches for conducting work
9. I think clearly in times of urgency
10. *I feel unequipped to deal with too much stress
11. I am good at developing unique analyses for complex problems
12. I am able to be objective during emergencies
13. My insight helps me to work effectively with others
14. *I am easily rattled when my schedule is too full
15. I usually step up and take action during a crisis
16. *I need for things to be ‘‘black and white’’
17. I am an innovative person
18. I make excellent decisions in times of crisis
19. *I become frustrated when things are unpredictable
20. I am able to make effective decisions without all relevant information
21. I am an open-minded person in dealing with others
22. I take action to improve work performance deficiencies
23. *I am usually stressed when I have a large workload
24. I am perceptive of others and use that knowledge in interactions
25. I often learn new information and skills to stay at the forefront of my profession
26. *I often cry or get angry when I am under a great deal of stress
27. When resources are insufficient, I thrive on developing innovative solutions
28. I am able to look at problems from a multitude of angles
29. I quickly learn new methods to solve problems
30. *I tend to perform best in stable situations and environments
31. When something unexpected happens, I readily change gears in response
32. I try to be flexible when dealing with others
33. I can adapt to changing situations
34. I train to keep my work skills and knowledge current
35. I am continually learning new skills for my job
36. I perform well in uncertain situations
37. I take responsibility for staying current in my profession
38. I adapt my behavior to get along with others

39. I easily respond to changing conditions
40. I try to learn new skills for my job before they are needed
41. I can adjust my plans to changing conditions

Note. * = reverse coded items.

Response options:
1 = Strongly Disagree
2 = Disagree
3 = Neither Agree nor Disagree
4 = Somewhat Agree
5 = Strongly Agree

[1] Adapted from:

Ployhart, R. E., & Bliese, P. D. (2006). Individual Adaptability (I-ADAPT) Theory: Conceptualizing the Antecedents, Consequences, and Measurement of Individual Differences in Adaptability. In *Understanding Adaptability: A Prerequisite for Effective Performance within Complex Environments* (Vol. 6, pp. 3–39). Elsevier. https://doi.org/10.1016/S1479-3601(05)06001-7